

PROJECT MANUAL FOR:

RENOVATIONS AND ADDITIONS FOR:
**CLAYTON ADDISON
MANUFACTURING
FACILITY (944)**

17921 COUNTY ROAD 41 NORTH
ADDISON, AL. 35540

OWNER:

CLAYTON HOMES
3916 FOUNTAIN VALLEY ROAD
KNOXVILLE, TN. 37918

COMM. NO. 180789.06
August 23, 2019

PROFESSIONALS OF RECORD:

ARCHITECT: ERIN HARLOW, AIA

Phone No. (865) 584-0999

STRUCTURAL ENGINEER: M. EDWARD JETT, PE

Phone No. (865) 584-0999

MECH. & PLUMBING ENGINEER: JOHN BUCHANAN, PE

Phone No. (865) 584-0999

ELECTRICAL ENGINEER: Steve Walker, PE

Phone No. (865) 584-0999

CIVIL ENGINEER: David Matlock, PE

ARCHITECT: _____

CONTRACTOR: _____

OWNER: _____

LENDER: _____

BONDING CO.: _____

MBI COMPANIES

299 N. Weisgarber Rd., Knoxville, TN 37919

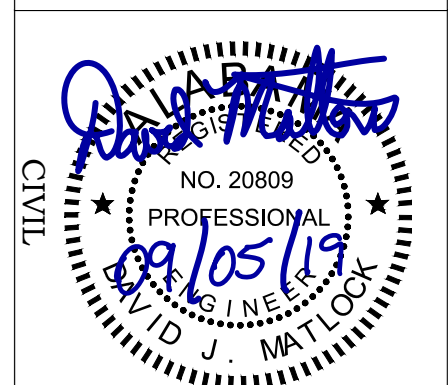
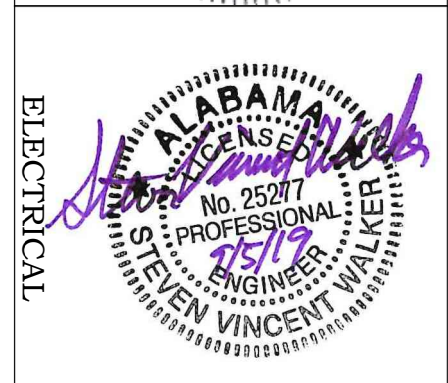
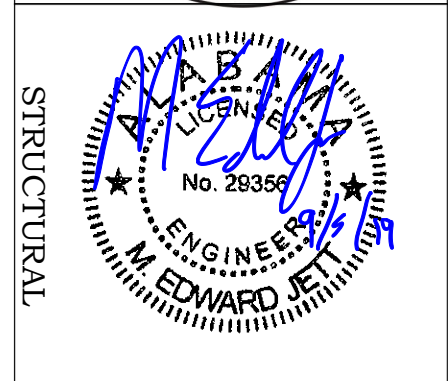
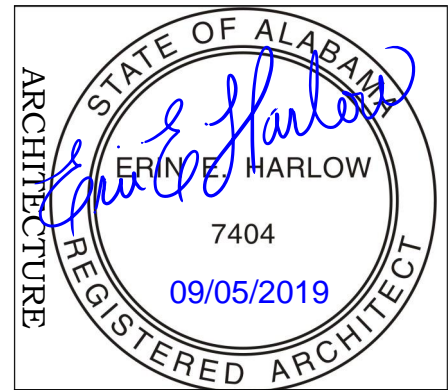
(865) 584-0999 / Fax (865) 584-5213

Web Page: www.mbicompanies.com

E-Mail: mbi@mbicompanies.com

Set No. _____

Knoxville, Tennessee



SECTION 00 01 15 - LIST OF CONTRACT DRAWINGS

The following drawings, identified as "Renovations and Additions for Clayton Addison Manufacturing Facility (944), 17921 County Road 41 North, Addison, AL 35540", comprise the list of Contract Drawings:

CVR Cover Sheet

CIVIL AND SITE ENGINEERING

C0.1	CIVIL LEGENDS & NOTES
C1.1	PHASE 1 & 2 EROSION PREVENTION & SEDIMENT CONTROL PLAN
C2.0	SITE DEMOLITION PLAN
C3.0	SITE LAYOUT PLAN
C4.0	SITE GRADING & DRAINAGE PLAN
C6.0	SITE UTILITY PLAN
C8.0	CIVIL DETAILS
C8.1	CIVIL DETAILS
L1.0	LANDSCAPE PLAN

ARCHITECTURAL

A0.0	GENERAL NOTES AND ACCESSIBILITY DETAILS
A0.1	LIFE SAFETY PLAN
A0.2	DEMOLITION PLAN
A0.3	INTERIOR WALL TYPES
A1.1	FIRST FLOOR PLAN
A2.1	DOOR SCHEDULE, DOOR/FRAME ELEVATIONS & DETAILS
A2.2	WINDOW ELEVATIONS AND DETAILS
A2.3	DOOR & WINDOW DETAILS
A3.1	ROOF PLAN AND DETAILS
A4.1	EXTERIOR ELEVATIONS
A4.2	EXTERIOR ELEVATIONS
A5.1	BUILDING SECTIONS
A5.2	WALL SECTIONS
A5.3	WALL SECTIONS
A6.1	ENLARGED PLANS AND DETAILS
A6.2	RESTROOM INTERIOR ELEVATIONS
A7.1	REFLECTED CEILING PLAN AND DETAILS
A8.1	MISC. DETAILS AND NOTES

INTERIOR DESIGN

F1.1	FINISH FLOOR PLAN
F2.1	INTERIOR ELEVATIONS
F2.2	INTERIOR ELEVATIONS
F3.1	INTERIOR ELEVATIONS & MILLWORK DETAILS

STRUCTURAL ENGINEERING

S0.0	STRUCTURAL NOTES
S0.1	TYPICAL FOUNDATION AND SLAB ON GRADE DETAILS
S0.2	TYPICAL STEEL DETAILS
S0.3	TYPICAL CFS DETAILS
S1.1	FOUNDATION PLAN
S3.1	ROOF FRAMING PLAN
S5.1	STRUCTURAL DETAILS
S5.2	STRUCTURAL DETAILS

MECHANICAL

FP0.1	FIRE PROTECTION LEGENDS, SPECIFICATIONS, AND NOTES
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FP1.1	FLOOR PLAN - FIRE PROTECTION
M0.1	MECHANICAL LEGENDS, SPECIFICATIONS, AND NOTES
M1.1	FLOOR PLAN - HVAC
M2.1	HVAC SCHEDULES
M3.1	HVAC DETAILS
P0.1	PLUMBING LEGEND AND NOTES
P1.1	FLOOR PLAN - SANITARY & STORM
P1.2	FLOOR PLAN - WATER & GAS
P2.1	PLUMBING SCHEDULES
P3.1	PLUMBING DETAILS

ELECTRICAL ENGINEERING

E0.1	ELECTRICAL LEGEND AND GENERAL NOTES
E1.1	FLOOR PLAN - POWER
E1.2	FLOOR PLAN - HVAC POWER
E2.1	FLOOR PLAN - LIGHTING
E3.1	FLOOR PLAN - COMMUNICATIONS AND FIRE ALARM
E4.1	RISER DIAGRAM AND PANELBOARD SCHEDULES
E4.2	PANELBOARD SCHEDULES
E5.1	ELECTRICAL DETAILS
ES1.1	SITE PLAN - ELECTRICAL
ES1.2	SITE PLAN - PHOTOMETRIC

End of Section

SECTION 00 31 32 - SUBSURFACE INVESTIGATION

1 PART I GENERAL:

1.01 GENERAL

- A. The Contractor's Scope of Work is to include soil borings and a Report of Subsurface Investigation by licensed geotechnical engineer. The Report of Subsurface Investigation is to include a minimum of (4) borings taken at the new building footprint. The Owner will not be responsible for the accuracy of such report. The Owner will not be responsible for interpretation or conclusions drawn by the Contractor from such report.

2 PART II PRODUCTS:

NOT USED

3 PART III EXECUTION:

NOT USED

End of Section



Clayton Addison (Plant 944) Breakroom Bid

Bidder Information

Date	
Company	
Contact Name	
Address	

Bid Items

Item Number	Description	Price	Comments/Exclusions
1	General Conditions		
2	Demolition		
3	Sitework		
4	Slab and foundations		
5	Structure		
6	Exterior panels/siding		
7	Roof		
8	Doors & windows		
9	Storefront		
11	Masonry		
12	Plumbing		
13	Sprinkler		
14	HVAC		
15	Electrical		
16	Roll up doors		
17	Exterior coverings & awnings		
18	Sheetrock and studs		
19	Paint		
20	*Flooring		
21	*Lighting		
22	Millwork		
23	Toilet partitions		
24	Signage		
25	Fencing		
26	Landscaping	\$50,000	
27	Remaining		
Total			

*Material costs for these items may be removed from the bid. Please indicate credit amounts for these items in the spaces below

Flooring _____
Lighting _____

Authorized Representative Signature

Date

Authorized Representative Name (Print)

SECTION 00 45 19 – NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____)
County of _____) ss.

_____, being first duly sworn, deposes and says
that:

1. He is _____
of _____
the Bidder who has submitted the attached Bid;
2. He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
3. Such Bid is genuine and is not a collusive or sham Bid;
4. Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm, or person, to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost element of the Bid price or the Bid prices of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against the Owner or any person interested in the Contract; and
5. The price or-prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

Signed _____

Title _____

SWORN TO and subscribed before me

This _____ day of _____, _____.

Notary Public

By: _____

Title: _____

My Commission Expires: _____, _____.

End of Section

SECTION 00 45 20 – NON-COLLUSION AFFIDAVIT OF SUBCONTRACTOR

State of _____)
) ss.
County of _____)

_____, being first duly sworn, deposes and says
that:

1. He is _____ of _____
(owner, partner, officer, representative, or agent) _____
hereinafter referred to as the "Subcontractor";
2. He is fully informed respecting the preparation and contents of the Subcontractor's Proposal submitted by the Subcontractor to _____, the Contractor for certain work in connection with the _____ Contract pertaining to the _____ Project in _____, (City or County and State);
3. Such Subcontractor's Proposal is genuine and is not a collusive or sham Proposal;
4. Neither the Subcontractor nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affidavit has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Proposal in connection with such Contract, or has in any manner, directly or indirectly, sought by unlawful agreement or connivance with any other Bidder, firm, or person to fix the price or prices in said Subcontractor's Proposal, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against _____ (Owner) or any person interested in the proposed Contract; and
5. The price or prices quoted in the Subcontractor's Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

Signed _____

Title _____

SWORN TO and subscribed before me
This _____ day of _____, _____.

Notary Public
By: _____
Title: _____
My Commission Expires: _____, _____.

End of Section

SPECIFICATION COMPLIANCE FORM

TO: Clayton Homes, 3916 Fountain Valley Road, Knoxville, TN 37918

PROJECT: Renovations and Additions For: Clayton Addison Manufacturing Facility (944), 17921
County Road 41 North, Addison, AL. 35540

Having carefully and thoroughly examined the Project Manual, including all Specifications, and all Drawings for the above referenced project, the Undersigned proposes to perform all Work contained therein in strict compliance with ALL included requirements.

The undersigned certifies that the following statements are correct and acknowledges each by initially the space adjacent to each:

_____ I understand that manufacturers and products provided on the Drawings and in the Project Manual ARE NOT specified as such to only provide a standard of quality but are, in fact, specified as such to also indicate the exact manufacturer and/or product intended by the Owner, Architect and/or Engineer for use in the construction of the above referenced project.

_____ I will not at any time use or install products that have not been approved in compliance with Division 1 requirements.

_____ I understand that I, nor any of those in my employ, have the authority to determine whether or not a product is "equal" to the specified product or basis of design.

_____ The proposed Base Bid includes all specified manufacturers, products and materials or manufacturers, products and materials which were approved in compliance with Division 1 requirements prior to submission of Bid proposal.

_____ I understand that my bid may be rejected if I did not bid all aspects of the project as specified.

Having certified the above to best of my knowledge, I further certify, by signature below, that failure(s) to comply with the specified products, procedures and/or requirements and the subsequent correction thereof, by course determined by the Architect or Engineer, shall not be grounds for additional compensation of time or monies whether or not such failures were intentional.

Signature & Date

Print Name

Title

Contractor Company Name

Contractor's License No.

Date of Expiration

License Classification

Address

MBI Companies Incorporated Electronic Release Form

At your request, MBI Companies Inc. (MBI) will provide electronic files for your convenience and use in the preparation of documents related to _____, subject to the following terms and conditions:

Electronic File(s) Transfer Fees are based on the following:

- ☐ **Adobe PDF format:** \$60.00 for the first drawing/file and \$30.00 for each additional drawing/file will be required. This fee is payable in advance and by credit card only.
- ☐ **Autodesk DWF format:** \$60.00 for the first drawing/file and \$30.00 for each additional drawing/file will be required. This fee is payable in advance and by credit card only.
- ☐ **Autodesk 2010 AutoCAD DWG format:** \$80.00 per drawing/file. This fee is payable in advance and by credit card only.
- ☐ **Autodesk 2010 Revit RVT format(if available):** ☐\$1500.00 Architectural model/file ☐\$1000.00 Structural model/file ☐\$1000.00 Mechanical model/file ☐\$1000 Plumbing model/file ☐\$1000.00 Electrical model/file ☐\$1000.00 Fire protection model ☐ \$4000.00 all model sets. This fee is payable in advance and by credit card only.
Large requests will be evaluated for the effort required to bundle and transfer the information and will be assessed on a case by case basis.

MBI makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced software.

Data contained on these electronic files is part of MBI's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of documents pertaining to the referenced project. Any use by you or others, will be your sole risk and without liability or legal exposure to MBI. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against MBI, its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless MBI from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to addenda, change orders or other revisions. MBI makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed Contract Documents prepared by MBI and Electronic Files, signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other Contractors for the project.

The fees listed above are for costs to un-archive, gather and transmit files only, and under no circumstances shall delivery of the electronic files for use by you be deemed a sale of the file(s) by MBI and MBI makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall MBI be liable for any loss of profit or any consequential damages. Usage by any parties of the data contained in the electronic files released shall constitute agreement to these terms.

Any requests for updated electronic files shall incur additional charges.

Please return this completed form by facsimile at the following number (865) 584-5213. Once the fees have been paid, the file(s) will be transferred to the indicated e-mail address and a receipt will be returned by mail.

Transfer Fee Amount: _____

Email Address: _____ Phone Number: _____

Method of Payment: _____ VISA _____ MasterCard _____ AMEX

Visa Code (Last 3 digits on back of card) _____ AMEX (4 digits on front of card) _____

Credit Card Number and Expiration Date: _____

Name & Address of Cardholder: _____

Cardholder Signature & Date _____

Contractor's Request for Information (RFI)

Project Name:	Contract No.:	Date:	RFI No.:
Contractor's Name:	To:		
Subject:			

References

Area(s):
Specification Section(s):
Drawing No.:
Other References:
Problem / Information Requested:

Information Requested by:

Reply needed by:

Contractor's Interpretation and Proposed Resolution:

Architect's / Engineer's Evaluation and Response

Disposition:	Clarification Only	Sketch or Drawing	Other
Approval:	Project Manager	Owner	Contractor



SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____ From (Contractor): _____

Date: _____

To (A/E): _____ A/E Project Number: _____

_____ Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact
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☐ Attachments

Signed by: _____

Date: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Statement of Special Inspections

Project:

Location:

Owner:

Design Professional in Responsible Charge:

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

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

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

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

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

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

Interim Report Frequency: _____

or ☐ per attached schedule.

Prepared by:

(type or print name)

Signature

Date

Design Professional Seal

Signature

Date

Owner's Acceptance:

Signature

Date

Building Official's Acceptance:

Schedule of Inspection and Testing Agencies

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

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

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Special Inspection Coordinator		
2. Inspector		
3. Inspector		
4. Testing Agency		
5. Testing Agency		
6. Other		

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

Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category

Quality Assurance Plan Required (Y/N)

Description of seismic force resisting system and designated seismic systems:

Quality Assurance for Wind Requirements

Basic Wind Speed (3 second gust)

Wind Exposure Category

Quality Assurance Plan Required (Y/N)

Description of wind force resisting system and designated wind resisting components:

Statement of Responsibility

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

Qualifications of Inspectors and Testing Technicians

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

Key for Minimum Qualifications of Inspection Agents:

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

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

American Concrete Institute (ACI) Certification

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

American Welding Society (AWS) Certification

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

American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.
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International Code Council (ICC) Certification

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

National Institute for Certification in Engineering Technologies (NICET)

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

Exterior Design Institute (EDI) Certification

EDI-EIFS	EIFS Third Party Inspector
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Other

STRUCTURAL OBSERVATION AGREEMENT

Structural observations shall be provided in Seismic Design Category D, E or F when one of the following conditions exists:

- () 1. The structure is classified as Occupancy Category III, or IV.
- () 2. The height of the structure is greater than 75 feet above the base.
- () 3. The structure is assigned to Seismic Design Category E, is classified as Occupancy Category I or II and is greater than two stories in height.
- () 4. When so designated by the Architect or Engineer of record.
- () 5. When such observation is specifically required by the Building Official.

ENGINEER OR ARCHITECT RESPONSIBLE FOR THE
STRUCTURAL DESIGN (PRINT OR TYPE)

SAME SIGNATURE DATE

DESIGNATED ENGINEER OR ARCHITECT TO PERFORM
STRUCTURAL OBSERVATION (PRINT OR TYPE)

SAME SIGNATURE DATE

Architectural Systems

Page of

Item	Agency # (Qualif.)	Scope
1. Wall Panels & Veneers		
2. Suspended Ceilings		
3. Access Floors		

4. Other:		
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Spray-Applied Fire Resistant Material

Page of

Item	Agency # (Qualif.)	Scope
1. Material Specifications		
2. Laboratory Tested Fire Resistance Design	ICC-SFSI	<i>Review UL fire resistive design for each rated beam, column, or assembly.</i>
3. Schedule of Thickness	ICC-SFSI	<i>Review approved thickness schedule.</i>
4. Surface Preparation	ICC-SFSI	<i>Inspect surface preparation of steel prior to application of fireproofing</i>
5. Application	ICC-SFSI	<i>Inspect application of fireproofing.</i>
6. Curing and Ambient Condition	ICC-SFSI	<i>Verify ambient air temperature and ventilation is suitable for application and curing of fireproofing.</i>
7. Thickness	ICC-SFSI	<i>Test thickness of fireproofing (ASTM E605). Perform a set of thickness measurements for every 1,000 SF of floor and roof assemblies and on not less than 25% of rated beams and columns.</i>
8. Density	ICC-SFSI	<i>Test the density of fireproofing material (ASTM E605).</i>
9. Bond Strength	ICC-SFSI	<i>Test the cohesive/adhesive bond strength of fireproofing ASTM E736). Perform not less than one test for each 10,000 SF.</i>

10. Other:		
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Exterior Insulation & Finish Systems (EIFS)

Page of

Item	Agency # (Qualif.)	Scope
1. Material Submittals		
2. Condition of Substrate		
3. Application of Foam Plastic Board		
4. Application of Coatings		
5. Application of Mesh		
6. Ambient Condition and Curing		
7. Flashing and Joint Details		
8. Sealants/Caulks		

9. Other:		
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Special Cases

Page of

Item	Agency # (Qualif.)	Scope

SUBSTITUTION REQUEST

TO: _____

PROJECT: Clayton Addison Manufacturing Facility (944), 17921 County Road 41 North, Addison, AL.
35540

SPECIFIED ITEM:

Section	Page	Paragraph	Description
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The undersigned request consideration of the following:

PROPOSED SUBSTITUTION: _____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following statements, unless modified by attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by: _____ For use by the A/E: _____

Signature: _____

Firm: _____ Approved _____ Approved as noted _____

Address: _____ Not Approved _____ Received too late _____

By: _____

Date: _____ Date: _____

Telephone: _____ Remarks: _____

Attachments

SPECIAL INSPECTION AGREEMENT

Project Title: _____

Architect's Comm. No.: _____

Project Address: _____

Contractor: _____ **Date:** _____

_____ **Project Manager:** _____

Phone: _____ **Fax:** _____ **Email:** _____

PERMIT NUMBER: _____ DATE: _____

OWNER: _____

APPROVED TESTING LABORATORY: _____

PROJECTNAME: _____

To permit applicants of projects requiring special inspection and/or testing per Section 1704 of the International Building Code (IBC):

BEFORE A PERMIT CAN BE ISSUED: The owner, or the registered design professional in responsible charge, acting as the owner's agent, shall complete two (2) copies of this agreement and the attached Special Inspection and Testing Schedule, including the required acknowledgments. A preconstruction conference with the parties involved may be required to review the special inspection requirements and procedures.

APPROVAL OF SPECIAL INSPECTORS: Special inspectors may have no financial interest in the construction of projects for which they provide special inspection. Special inspectors shall be approved by the building department prior to performing any duties. Special inspectors shall submit their qualifications and are subject to personal interviews for prequalification. Special inspectors shall display approved identification, as stipulated by the building official, when performing the function of special inspector.

Special inspection and testing shall meet the minimum requirements of International Building Code

Section 1704. The following conditions are also applicable:
180789.06

00 64 01.1

DUTIES AND RESPONSIBILITIES OF THE SPECIAL INSPECTOR:

1. Signify presence at jobsite. Special inspectors should notify contractor personnel of their presence and responsibilities at the jobsite. If required by the building official, they shall sign in on the appropriate form posted with the building permit.

2. Observe assigned work. The special inspector shall observe assigned work for conformance with the building department approved (stamped) design drawings and specifications and applicable workmanship provisions of the International Building Code. Architect/engineer reviewed shop drawings may be used only as an aid to inspection.

For continuous special inspection, the special inspector shall be on site at all times work is in process observing the work requiring continuous special inspection. Periodic inspections, if any, must have prior written approval based on a separate written plan reviewed and approved by the registered design professional in responsible charge. Periodic inspection is intended to mean that the inspector at periodic times inspects all work performed but is not required to "witness" the work being performed.

3. Report nonconforming items. The special inspector shall bring nonconforming items to the immediate attention of the contractor and note all such items in the daily report. If any item is not resolved in a timely manner or corrective action is not incorporated in the work, the special inspector shall immediately notify the building department by telephone or in person, notify the registered design professional in responsible charge and post a discrepancy notice. Any nonconforming items not corrected within 14 consecutive calendar days shall be issued to the Design Professional in Responsible Charge and the Building Department as a discrepancy notice.

4. Provide timely reports. The special inspector should complete written inspection reports for each inspection visit and provide the reports on a timely basis determined by the building official and to the Design Professional in Responsible Charge. The special inspector or inspection agency shall furnish these reports directly to the building official, registered design professional in responsible charge and others as designated

These reports should be organized on a daily format and may be submitted minimum weekly to the Design Professional in Responsible Charge and to the Building Official at his option.. Examples of daily

and weekly report forms are included in Appendix A. These reports should include:

- a. Description of daily inspections and tests made with applicable locations;
- b. Listing of all nonconforming items;
- c. Report on how nonconforming items were resolved or unresolved as applicable; and
- d. Itemized changes authorized by the architect, engineer and building official if not included in nonconforming items.

5. Submit final report. The special inspector or inspection agency shall submit a final signed report to the Design Professional and the building official stating that special inspection and testing requirements were fulfilled and reported and, to the best of his/her knowledge, in conformance with the approved design drawings, specifications, approved change orders and the applicable workmanship provisions of the International Building Code. Items not in conformance, unresolved items or any discrepancies in inspection coverage (i.e., missed inspections, periodic inspections when continuous were required, etc.) shall be specifically itemized in this report.

B. Owner Responsibilities. The project owner, the registered design professional in responsible charge or an agent of the owner is responsible for employing special inspection services. The special inspector/agency shall not be in the employ of the contractor, subcontractor or material supplier (see IBC Section 1704.1). In the case of an owner/contractor, the special inspector/agency shall be employed as specified by the building official.

C. Registered Design Professional in Responsible Charge Responsibilities

1. Prepare special inspection program. The registered design professional in responsible charge shall list the items for which special inspection is required and shall indicate which, if any, items for which the IBC or the building official approves periodic inspection and the frequency of such inspection.

2. Respond to field discrepancies. The registered design professional in responsible charge shall respond to discrepancy notices issued by the special inspector.

3. Review shop drawings and submit design changes. The registered design professional in responsible charge shall acknowledge and approve shop drawings that may detail structural

information, shall submit to the building official and to the special inspection agency written approval of any verbally approved deviations from the approved plans and shall submit revised plans for building official approval as required.

D. Contractor Responsibilities

1. Notify the special inspector. The contractor is responsible for notifying the special inspector or agency regarding individual inspections for items listed on the attached schedule and as noted on the building department approved plans. Adequate notice shall be provided so the special inspector has time to become familiar with the project.
2. Provide access to approved plans. The contractor is responsible for providing the special inspector access to approved plans.
3. Retain special inspection records. The contractor is also responsible for retaining at the jobsite all special inspection records completed by the special inspector upon request.

E. Building Department Responsibilities

1. Approve special inspection program. The building department shall approve all special inspectors and special inspection requirements.
2. Enforce special inspection. Work requiring special inspection and the performance of special inspectors shall be monitored by the building inspector. His/her approval must be obtained prior to placement of concrete, covering of structural steel or other similar activities in addition to that of the special inspector.
3. Review inspection reports. The building official should review special inspection progress and final reports.
4. Perform final inspection. The building official should perform the final inspection and approval for a project (see IBC Section 109.3.10) after the final special inspection report has been reviewed and approved.

ACKNOWLEDGMENTS

I have read and agree to comply with the terms and conditions of this agreement.

Owner:

_____ By: _____ Date: _____

Project Engineer/Architect:

_____ By: _____ Date: _____

Special Inspections Coordinator (As designated by the Owner):

_____ By: _____ Date: _____

Geotechnical Engineer:

_____ By: _____ Date: _____

Contractor:

_____ By: _____ Date: _____

Special Inspector or Inspection Agencies:

_____ By: _____ Date: _____

_____ By: _____ Date: _____

_____ By: _____ Date: _____

_____ By: _____ Date: _____

_____ By: _____ Date: _____

_____ By: _____ Date: _____

ACCEPTED FOR THE BUILDING DEPARTMENT

By: _____ Date: _____

SPECIAL INSPECTION AND TESTING SCHEDULE

1. Concrete

- ☐ Continuous placement inspection
☐ Exceptions _____
☐ _____ Cylinders per _____ CY
 Test: _____ @7 _____ @28 _____ Hold

2. Bolts installed in concrete

- ☐ All bolts
☐ Location: _____

3. Special moment-resisting concrete frame

- ☐ As Indicated
☐ Location: _____

4. Reinforcing steel and prestressing tendons

- ☐ Placement inspection
☐ Stressing and grouting of tendons

5. Structural Welding

Periodic Visual Inspection:

- ☐ Single pass fillet welds < 5/16"
☐ Steel deck
☐ Welded studs
☐ Cold formed studs and joists
☐ Stair and railing systems
☐ Reinforcing steel

Continuous Visual Inspection

- ☐ All other welding
☐ Reinforcing steel
☐ Other _____

Special moment-resisting frames:

- ☐ UT all CJP groove welds
☐ UT all CJP groove welds > 5/16"
☐ UT all PP groove welds in column splices
☐ UT all PP groove welds in column splices > 3/4"
☐ UT column flanges at beam flange welds
☐ NDT rate reduction per UBC 1703.1 applies
☐ Other _____

6. High strength bolting

- Snug Tight: ☐ All
☐ As Indicated
 Full Pretension ☐ All
☐ As Indicated

7. Structural Masonry $f'_m =$ _____, Stresses _____

- Verification of f'_m : ☐ Prism tests
☐ Prism test record
☐ Unit strength

- ☐ Continuous inspection
☐ Periodic inspection: _____

7. Structural masonry (continued)

- | | | |
|--------|--------------------------|--------------------------|
| Test: | Before | During |
| Prisms | <input type="checkbox"/> | <input type="checkbox"/> |
| Units | <input type="checkbox"/> | <input type="checkbox"/> |
| Grout | <input type="checkbox"/> | <input type="checkbox"/> |
| Mortar | <input type="checkbox"/> | <input type="checkbox"/> |

8. Reinforced gypsum concrete

- ☐ Continuous inspection of mixing and placement
☐ Periodic inspection _____
☐ Strength testing _____

9. Insulating concrete fill

- ☐ Periodic inspection _____
☐ Strength testing _____

10. Spray-applied fire resistive materials

- ☐ Periodic inspection _____
☐ Testing per UBC Std. 7-6

11. Piling, drilled pier and caisson

- | | | |
|--------------|--------------------------|--------------------------|
| | Continuous | Periodic |
| Pile Driving | <input type="checkbox"/> | <input type="checkbox"/> |
| Drilling | <input type="checkbox"/> | <input type="checkbox"/> |
| Testing | <input type="checkbox"/> | <input type="checkbox"/> |

12. Shotcrete

- ☐ Continuous placement inspection
☐ Preconstruction panel
☐ In-place cores
 Strength testing:
☐ Test panel
☐ In-place cores

13. Special grading, excavation, and filling

- ☐ Periodic Inspection
☐ Subgrade tests _____
☐ Compaction tests _____
☐ Verify bearing strata

14. Smoke control systems

- ☐ Periodic inspection during ductwork erection
☐ During system testing

15. Special cases

- ☐ Shear wall/diaphragm nailing
 Anchorage to existing concrete/masonry
☐ Installation inspection
☐ Proof load testing
☐ Shoring
☐ Underpinning

Notes:

SPECIAL INSPECTION DAILY REPORT

City/County of _____ Permit No.: _____ Date : _____

Project Name/Address: _____

Inspection Type(s)/Coverage: _____

Continuous Periodic; frequency: _____

Inspections made, including locations: _____

Tests performed: _____

Items requiring 1) Correction, 2) Correction of previously listed items and 3) Previously listed uncorrected items: _____

Changes to approved plans authorized by registered design professional in responsible charge: _____

Comments: _____

To the best of my knowledge, work inspected was in accordance with the building department approved plans, specifications and applicable workmanship provisions of the IBC except as noted above.

Signed: _____ Inspection Agency: _____

Print full name: _____ ID Number: _____

SPECIAL INSPECTION DISCREPANCY NOTICE

City/County of _____ Permit No.: _____ Date : _____

Project Name/Address: _____

Inspection Type(s)/Coverage: _____

Continuous Periodic; frequency: _____

Notice delivered to: Contractor Engineer/Architect Building Department

The following discrepancies require correction and inspection approval prior to proceeding with this phase of the work:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page or a sheet of stationery designed for writing.

Signed: _____ Inspection Agency: _____

Print full name: _____ ID Number: _____

DO NOT REMOVE THIS NOTICE

Post with building permit inspection record card

SPECIAL INSPECTION WEEKLY REPORT

City/County of _____ Permit No.: _____ Date : _____

Project Name/Address: _____

Inspection Type(s)/Coverage: _____

Continuous Periodic; frequency: _____

Total inspection time each day:

Dates

Hours

Inspector

Inspections made, including locations: _____

Tests performed: _____

Items requiring 1) Correction, 2) Correction of previously listed items, and 3) Previously listed uncorrected items: _____

Changes to approved plans authorized by registered design professional in responsible charge: _____

Comments: _____

To the best of my knowledge, work inspected was in accordance with the building department approved plans, specifications and applicable workmanship provisions of the IBC except as noted above.

Signed: _____ Inspection Agency: _____

Print full name: _____ ID Number: _____

cc: Building Department

Engineer/Architect

SPECIAL INSPECTION FINAL REPORT

City/County of _____ Permit No.: _____ Date: _____

Attention: _____

Project Name/Address: _____

In accordance with Section 1704 of the International Building Code, special inspection has been provided for the following items:

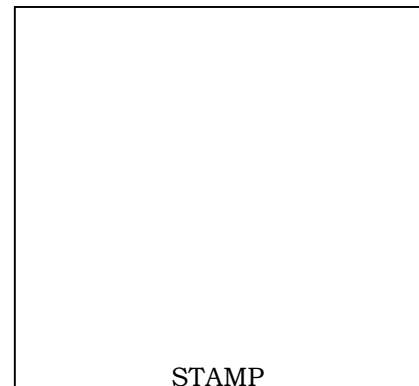
Based upon inspections performed and our (my) substantiating reports, it is our (my) professional judgment that, to the best of our (my) knowledge, the inspected work was performed in accordance with the approved plans, specifications and applicable workmanship provisions of the International Building Code.

Signed: _____ Inspection Agency: _____

Print full name: _____ ID Number: _____

or Agency Responsible Engineers stamp:

cc: Client/Project Owner
 Engineer/Architect



SPECIAL INSPECTION RECORD

Inspection Agency: _____

City of _____ Project Address: _____

Project Title: _____ Building Permit No.: _____

NOTE: Each special inspector shall complete for each day's inspection. Post this card adjacent to building permit inspection report card. Weekly reports to be submitted by each special inspection/inspection agency to the building department.

When attached to the job inspection record card, this card becomes a part of the inspection record.

INSPECTION TYPE	SPECIAL INSPECTOR	ID NO.	DATE	NOTES	TIME	
					ARR	LEFT



AIA[®] Document A201[™] – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Renovations and Additions for:
Clayton Maynardville Manufacturing Facility
164 Raccoon Valley Road
Maynardville, TN 37807

MBI Comm. No.: 180789.03

THE OWNER:

(Name, legal status and address)

Clayton Homes
3916 Fountain Valley Road
Knoxville, TN 37918

THE ARCHITECT:

(Name, legal status and address)

Michael Brady Inc.
299 N. Weisgarber Road
Knoxville, TN 37919

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ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503[™], Guide for Supplementary Conditions.

Init.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

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

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

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

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

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

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

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

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

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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

§ 3.5 Warranty

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

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely

upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

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

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

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

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

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

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

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

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

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

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

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

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

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

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

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

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

§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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

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

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

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

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

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

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

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

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or

expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during

that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

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

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

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

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

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

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;

- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

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

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

Additions and Deletions Report for

AIA® Document A201™ – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 16:22:21 ET on 01/28/2019.

PAGE 1

Renovations and Additions for:
Clayton Maynardville Manufacturing Facility
164 Raccoon Valley Road
Maynardville, TN 37807

MBI Comm. No.: 180789.03

...

Clayton Homes
3916 Fountain Valley Road
Knoxville, TN 37918

...

Michael Brady Inc.
299 N. Weisgarber Road
Knoxville, TN 37919

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, _____, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:22:21 ET on 01/28/2019 under Order No. 8269282453 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS

1PART I GENERAL:

- 1.01 The following amendments modify, change, delete from or add to the General Conditions of the Contract for Construction (AIA Document A201, 2007 Edition), hereinafter referred to as the General Conditions. Where any part of the General Conditions is modified or voided by these amendments the unaltered provisions of that part shall remain in effect.

1.02 INTENT OF CONTRACT DOCUMENTS:

- A. Add the following Subparagraphs 1.2.4 and 1.2.5 at the end of Paragraph 1.2, Execution, Correlation, and Intent:

1.2.4 If there is any conflict or discrepancy within or between any of the Contract Documents involving the quality or quantity of work required, it is the intention of the Contract that the work of highest quality or greatest quantity shown or specified shall be furnished, unless such conflict or discrepancy shall have been brought to the Architect's attention and clarified by Addendum prior to the opening of bids.

1.2.5 Whether or not the word "ALL" is used in the specifications, coverage is intended to be complete, except where partial coverage is specifically and expressly noted. In all cases where an item is referred to in the singular number, it is intended that the reference shall apply to as many such items as are required to complete the work. Words such as "Install", "Provide", "Furnish", and "Supply" shall be construed as meaning complete furnishing, installing, and constructing unless modified by additional information.

1.03 DOCUMENTS FURNISHED TO THE CONTRACTOR:

- A. Revise Subparagraph 2.2.5 to read as follows: Copies of the Drawings and Specifications will be available to the General Contractor at the cost of reproduction subject to the provisions of Paragraph 1.5, Ownership and use of Drawings, Specifications, and other Instruments of Service. All Drawings and Specifications furnished to the Contractor shall be subject to the provisions of Paragraph 1.5, Ownership and use of Drawings, Specifications, and other Instruments of Service.
- B. Add Subparagraph 2.2.6 at the end of Paragraph 2.2, Information and Services Required of the Owner:

2.2.6 Electronic data files produced by the Architect containing information about the project are instruments of service and shall be subject to the provisions of Paragraph 1.5, Ownership and use of Drawings, Specifications, and other Instruments of Service. Electronic data files are not Contract Documents and differences may exist between these electronic files and the hard copy documents issued as Contract Documents. These files may be made available to the Contractor for convenience in preparing documents relating to the project upon execution of an electronic files release and payment of transfer fees as stated in the electronic files release.

1.04 REVIEW OF CONTRACT DOCUMENTS:

- A. Add the following Subparagraph 3.2.5 at the end of Paragraph 3.2, Review of Contract Documents and Field Conditions by Contractor:

3.2.5 Should discrepancies or conflicts in the requirements of the Drawings and Specifications be discovered after the work has started, the Contractor shall report such discrepancies or conflicts to the Architect immediately and no work affected thereby shall be started, or if started, shall be stopped immediately until the Contractor and the Architect agree upon clarification of the discrepancy or conflict.

1.05 PERMITS, FEES AND NOTICES:

- A. Add the following Subparagraph 3.7.6 at the end of Paragraph 3.7, Permits, Fees, Notices, and Compliance with Laws:

3.7.6 The Contractor shall obtain a Certificate of Occupancy from the Building Inspection Department having jurisdiction for each phase of the project as it is completed and ready for occupancy and shall deliver such certificate to the Architect.

1.06 SUBMITTALS:

- A. Add the following Subparagraphs 3.12.11 and 3.12.12 at the end of Paragraph 3.12, Shop Drawings, Product Data and Samples:

3.12.11 Additional provisions pertaining to shop drawings and samples are included in Division 1, General Requirements.

3.12.12 Submittals that have not been marked as reviewed, signed and dated by the Contractor may be returned by the Architect without action.

1.07 SUBCONTRACTURAL RELATIONS:

- A. Add the following Subparagraphs 5.3.1 and 5.3.2 to Paragraph 5.3, Subcontractual Relations:

5.3.2 The Contractor shall be directly responsible for all of the work included in the Contract, whether performed by his own forces or by his subcontractors. Except in extreme emergencies, all instructions, clarifications, and approvals will be given by the Architect to subcontractors only through the Contractor and all shop drawings, samples, and correspondence from the subcontractor shall be submitted to the Architect through the Contractor.

5.3.3 Insofar as it does not affect the quality of workmanship or materials, the Contractor shall settle all questions of responsibility arising among his various subcontractors and shall determine the extent of work and responsibility of each of the subcontractors.

1.08 CHANGES IN THE WORK:

- A. Add the following Subparagraph 7.4.1 to Paragraph 7.4, Minor Changes in the Work:

7.4.1 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials, and subcontractors. **Where major cost items are subcontracts, they shall be itemized also. In no case will a change involving over \$500.00 be approved without such itemization.**

- B. Change Sub-subparagraph .5 of Subparagraph 7.3.7 to the following:

.5 Overhead and profit of which the maximum amount of allowable given in this Subparagraph shall be considered to include, but is not limited to, job-site staff and office expense, incidental job burdens, small tools, bonds, insurance and home office overhead allocation. The percentages for overhead and profit shall not exceed the following:

To Contractor on work performed by other than its own forces - 5% profit;

To first-tier Subcontractor on work performed by its Sub-subcontractors - 5% profit; and

To Contractor and/or Subcontractors for that portion of the work performed with their respective forces - 10% overhead and 5% profit.

1.09 APPLICATIONS FOR PAYMENT:

- A. Add the following Clauses 9.3.4 and 9.3.5, in Paragraph 9.3, Applications for Payment:

9.3.4 Until the work is fifty percent (50%) complete, the Owner will pay ninety percent (90%) of the amount due the Contractor on account of progress payments, provided, however, that the retainage amount may not exceed five percent (5%) of the amount of such Contract. At the time the work is fifty percent (50%) complete and thereafter, in the absence of other good and sufficient reasons, the Architect will, on presentation by the Contractor of Consent of Surety for each Application, authorize any remaining partial payments to be paid in full.

9.3.5 The Contractor is to use the 1992 Edition of AIA Document G702, Application and Certificate for Payment. **Beginning with the second Application for Payment, the Contractor shall verify that he has paid all subcontractors and major material suppliers those respective amounts representing all work and materials which have formed the basis of previous progress payments.** The application shall be submitted in three notarized copies.

1.10 PROGRESS PAYMENTS:

- A. Revise Subparagraph 9.6.1, to read as follows:

Unless otherwise provided in the agreement, the Owner will make progress payments to the Contractor on or about the fifteenth (15th) day of each calendar month on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month. In preparing estimates, materials delivered to and properly stored on the site shall be given consideration. **Materials stored off-site shall not be paid for by the Owner unless the Contractor furnishes a certificate of insurance for that material showing the Owner as the Owner of said material.**

- 1.11 Add Subparagraph 9.6.8 at the end of Subparagraph 9.6, Progress Payments.

9.6.8 Upon commencement of the work, an escrow account as provided by Tennessee Code Annotated, Section 4-15-102; Section 66-11-144 and Title 66, Chapter 34, shall be established in a financial institution chosen by the Contractor and approved by the Owner. The escrow agreement shall provide that the financial institution will act as escrow agent, will pay interest on funds deposited in such account in accordance with provisions of the escrow agreement and will disburse funds from the account upon the direction of the Owner as set forth below. Compensation to the escrow agent for establishing and maintaining the escrow account shall be paid from interest accrued to the escrow account.

1.12 FINAL PAYMENT:

- A. In Subparagraph 9.10.2, item (5), delete the words "if required by the Owner"; and replace the words "releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner" with the following: "Contract Close Out Submittals as enumerated in Section 01 33 00 Submittals and as reviewed and approved by the Architect.

1.13 COSTS FOR DELAYS IN COMPLETION:

- A. Add the following Subparagraph 9.8.6 at the end of Paragraph 9.8, Substantial Completion:

9.8.6 As actual damages for any delay in completion are impossible of determination, the Contractor and his sureties shall be liable for and shall pay to the Owner the sum of Five Hundred Dollars (\$500.00) as fixed, agreed, and liquidated damages for each calendar day of delay until a Certificate of Substantial Completion is executed by the Owner, Architect, and Contractor.

- B. Add the following Subparagraph 9.10.6 at the end of Paragraph 9.10, Final Completion and Final Payment:

9.10.6 If after Substantial Completion of the work and issuance of the Punch List, Final Completion of the Work is delayed beyond the time allotted for completion of the Punch List through no fault of the Owner or the Architect, the Contractor shall be liable for such ongoing costs as the Architect shall incur on the Project. Such costs shall be computed and billed to the Contractor at the Architect's standard hourly rates in effect at the time the work is executed. Payment shall be required within thirty (30) days of invoice. Interest shall accrue at one percent (1%) per month on past due amounts. Contractor shall be liable for all legal fees if legal action is required for collection of unpaid amounts.

1.14 CONTRACTOR'S LIABILITY INSURANCE:

- A. In Subparagraph 11.1.1 in the second line, following the phrase "in which the Project is located", insert the following clause: ",and to which the Owner has no reasonable objections,".

1.15 LIMITS OF CONTRACTOR'S LIABILITY INSURANCE:

Add the following Clause 11.1.2.1 to Subparagraph 11.1.2:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:

- A. Workmen's Compensation:

- | | | |
|----|-----------------------|---|
| 1. | State: | Statutory |
| 2. | Employer's Liability: | \$100,000.00 Each Accident
\$500,000.00 Disease - Policy Limit
\$100,000.00 Disease - Each Employee |

- B. Comprehensive General Liability (including Premises-Operations; Independent Contractors' Products/Completed Operations; Contractual; Personal injury):

- | | | |
|----|--|--------------------------|
| 1. | Bodily Injury & Property Damage, combined single limit: | |
| | Each Occurrence: | \$1,000,000.00 |
| | Annual Aggregate: | \$1,000,000.00 |
| 2. | Products/Completed Operations to be maintained for One Year after Final Payment. | |
| | | \$5,000,000.00 Aggregate |
| 3. | Property Damage Liability Insurance shall provide X, C, and U Coverage, and Coverage for any Special Hazards such as Blasting. | |

- C. Comprehensive Automobile Liability (including Owned, Hired and Non-Owned):

- | | | |
|----|---|-----------|
| 1. | Bodily Injury/Property Damage Combined: | \$500,000 |
|----|---|-----------|

- D. Umbrella Liability: \$2,000,000

1.16 OWNER'S LIABILITY INSURANCE:

- A. Replace Paragraph 11.2. with the following:

11.2. The Contractor shall take out and furnish to the Owner and maintain during the life of this Contract complete Owner's Protective Liability Insurance in amounts as specified in the limits of

Contractor's Liability Insurance for Bodily Injury and Property Damage. This policy shall be made out in the name of the Owner and the Architect.

1.17 PROPERTY INSURANCE (BUILDER'S RISK)

- A. In Subparagraph 11.3.1, in the phrase: "Unless otherwise provided, the Owner", change the word "Owner" to "Contractor".
- B. Delete Subparagraph 11.3.1.2.

1.18 PROPERTY INSURANCE DEDUCTIBLES:

- A. Revise Subparagraph 11.3.1.3 to read as follows:

11.3.1.3 If by the terms of this insurance any mandatory deductibles are required, the Contractor shall be responsible for payment of the amount of the deductible in the event of a paid claim.

1.19 PERFORMANCE BOND AND PAYMENT BOND

- A. Change Subparagraph 11.4.1 to read as follows:

11.4.1 The Contractor shall execute a performance bond and a payment bond in an amount equal to one hundred percent (100%) of the Contract Sum and a payment bond covering and including labor and materials in an amount equal to one hundred percent (100%) of the Contract Sum. Bond shall be executed on AIA Document A311 and A312. Such bond shall be from a surety Company authorized to transact business in the State of Tennessee and Company shall be registered in Federal Register, Department of the Treasury, Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies; Notice. Attorneys in Fact who sign any bonds must file with each instrument a certified and effective dated copy of their power of attorney.

- B. Add the following Subparagraph 11.4.1.1 to the end of Subparagraph 11.4.1:

11.4.1.1 Mechanical, Plumbing and Electrical Subcontractors shall execute a performance bond in an amount equal to one hundred percent of the Contract Value of their portion of the work and a payment bond covering and including labor and materials in an amount equal to one hundred percent (100%) of the Contract Value of their portion of the work. Performance and Labor and Material Payment Bonds shall be executed on AIA Form A311 and A312. Such bond shall be from a surety Company authorized to transact business in the State of Tennessee and Company shall be registered in Federal Register, Department of the Treasury, Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies; Notice. Attorneys in Fact who sign any bonds must file with each instrument a certified and effective dated copy of their power of attorney.

1.20 INSPECTIONS AND CORRESPONDENCE:

- A. Add the following Subparagraph 13.5.7 to the end of Paragraph 13.5, Tests and Inspections:

13.5.7 Inspections and or correspondence by the Architect required due to failure by the Contractor to obtain inspections and approval from the Public Authorities having jurisdiction are beyond the scope of Construction Contract Administration for the Architect. As additional services, the Contractor will be billed a minimum fee of Five Hundred Dollars (\$500.00) per occurrence plus the Architect's time at the Architect's standard hourly rate for the personnel required to perform these functions.

1.21 INTEREST:

- A. Revise Paragraph 13.6 to read as follows:

"Payments due and unpaid for thirty (30) days under the Contract Documents shall bear interest from the date thirty (30) days after payment is due at the rate of 1/2% (0.5 percent) per month.

1.22 MEDIATION:

- A. Delete Paragraph 15.3 Mediation, entirely and delete all references to mediation elsewhere in the General Conditions.

1.23 TIME:

- A. Time is an essential consideration of the Contract and work shall commence on the date to be specified in a written notice to the Contractor to proceed and shall progress with a proper and sufficient force of workmen and ample supply of materials and equipment to complete the Contract within the time limit agreed to in the Contract for Construction.

1.24 SUBSTITUTIONS:

- A. All requests shall be submitted to the Architect in writing with a fully executed substitution request form and shall clearly define and describe materials, methods or equipment for which approval is requested.
- B. Prior to Execution of a Contract for Construction:
 - 1. If any Contractors desire to substitute any firms, materials, brands, methods, etc., other than specified, he may have the privilege at any time prior to ten days before bidding, of submitting these matters to the Architect for approval.
 - 2. Requests shall be submitted by the General Contractor. Direct requests by manufacturer or material suppliers will not be considered.
 - 3. If such submissions are approved by the Architect or if the Architect shall decide to enlarge the scope of the Specifications, such approvals or additional information will be made by Addendum to the Contractor.
- C. After Execution of a Contract for Construction:
 - 1. Substitutions after execution of a Contract for Construction will, generally, not be considered, except under unusual circumstances, such as strikes, lockouts, bankruptcy, discontinuing of a product, etc.
 - 2. Requests for substitutions shall be made in writing to the Architect within ten (10) days of the date that the Contractor ascertains that he cannot obtain the material or equipment specified.
 - 3. Requests shall be accompanied by complete description of the material or apparatus to be submitted. On request from the Architect, samples of any of all such items shall be submitted and/or set up as directed for inspection and consideration. The amount of credit or extra cost to the Owner on account of the substitution shall be a part of this request.
 - a. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - i. Statement indicating why specified material or product cannot be provided.
 - ii. The amount of credit or extra cost to the Owner on account of the substitution

- iii. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
- iv. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
- v. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
- vi. Samples, where applicable or requested.
- vii. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
- viii. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
- ix. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
- x. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
- xi. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

D. "Or Approved Equal" or "Or Approved Substitution"

- 1. Where the phrase "or approved equal" or "approved substitution" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this work by the Architect
 - a. Color choices will be one of the determining factors for approval.
- 2. The decision of the Architect will be final.

1.01 STANDARDS:

- A Any material or other work specified by reference to the number, symbol, or title of a specific standard, such as American National Standards Institute (ANSI) Standard, a Federal Specification, a trade association standard, or other similar standard, shall conform to the requirements in the latest revision thereof or any amendment or supplement thereto in effect on the date of the drawings and specifications, except as limited to type, class or grade, or as modified in such reference.
- B The standards referred to, except as modified in the specification, shall have full force and effect as though recited for the reason that the manufacturers and trades involved are assumed to be

familiar with their requirements. The Architect will furnish, upon request, information as to how copies of the standards referred to may be obtained.

- C Where material or work is specified by reference to conform to standards such as listed in Paragraph A above, or to Codes, Laws, and Regulations, but specific provisions of the Contract Drawings or Contract Specifications exceed the requirements of such references, the Contract Drawings and Specifications shall govern.

1.02 MANUFACTURER'S DIRECTIONS:

- A All manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's instructions and recommendations. Any conflicts between such manufacturer's instructions and recommendations and the specifications shall be brought to the attention of the Architect and the procedures reconciled before proceeding with the work.

1.03 GUARANTEE:

- A All work under this Contract shall be guaranteed for a period of one (1) year after execution of Certificate of Substantial Completion against defects caused by the use of inferior materials or workmanship. Guarantee period of incomplete items at time of execution of Certificate of Substantial Completion shall commence on date of installation into building. Repair and/or replace all such defective materials or equipment and any work damaged thereby or make any other adjustment necessary without additional cost to the Owner.

1.04 LAYING OUT WORK:

- A The Contractor shall, immediately upon entering the projects for the purpose of beginning work, locate all general reference points and be responsible for all lines, elevations, and measurements.

2PART II PRODUCTS:

NOT USED

3PART III EXECUTION:

NOT USED

End of Section

SECTION 01 10 00 - SUMMARY OF THE WORK

PART I GENERAL

1.01 WORK INCLUDED:

- A. Furnish all labor, materials and equipment, and perform all work to construct, as specified herein and as shown on the accompanying drawings entitled "Renovations and Additions for Clayton Addison Manufacturing Facility (944), 17921 County Road 41 North (CR41), Addison, AL. 35540", The building shall be constructed complete and ready for occupancy except for the items specifically excluded in "Work Not Included".
- B. The work shall include; selective demolition, site preparation, building construction, plumbing, heating, ventilating and air conditioning; electrical work; special equipment as specified; furnishings, and site improvements as shown and specified.
- C. Patch any existing work damaged by construction.

1.02 WORK NOT INCLUDED:

- A. The following items of work will be provided by the Owner or by others under separate contracts:
 - 1. Movable furniture unless specifically shown on the drawings and specifications.
 - 2. Security System Equipment.
 - 3. Telephone System Equipment.
 - 4. Computer System Equipment.
 - 5. Point of Sale Equipment.
 - 6. Any other items noted on the drawings as "N.I.C." or "Not In Contract".
- B. The following work in connection with the items listed in paragraph 1.02A preceding shall be part of the General Contract work:
 - 1. Verification of correct location of electrical receptacles, telephone outlets, water and waste connections and similar outlets to suit equipment arrangement.
 - 2. Provision of telephone outlet boxes and conduit turned out above ceiling for use by owner's telephone contractor.

1.03 OCCUPANCY OF THE BUILDING DURING CONSTRUCTION:

- A. The Contractor shall schedule and organize his work in such a manner and use such methods that will interfere as little as possible with other work in progress on the site and with the operation of adjacent buildings.
- B. The Building will be occupied during the course of construction. The Contractor shall schedule his work in a manner to minimize disruption of use of existing facilities by his construction activities

1.04 CONTRACTOR'S USE OF PREMISES:

- A. Before construction is started the Contractor shall confer with the Architect and the Owner and arrange for available trucking and storage space for the delivery of materials, storage space for materials and equipment, and parking space for his workmen.
- B. Construction operations and storage of materials and equipment shall be restricted to areas of the site mutually agreed upon and in such a manner as not to block access of fire fighting equipment to the building and facilities.
- C. Construction vehicular traffic and the operation of construction equipment such as cranes, bulldozers, and other similar equipment shall be carefully supervised and controlled to avoid damage to existing structures and facilities which are to remain in place.

1.05 VERIFICATION OF DIMENSIONS:

- A. Dimensions, elevations, and locations shown on the drawings in reference to existing structures and utilities are the best available data obtainable but are not guaranteed by the Architect or the Owner and the Architect and the Owner will not be responsible for their accuracy.
- B. Before proceeding with any work dependent upon the data involved, the Contractor shall field check and verify all dimensions, grades, line levels, or other conditions of limitations at the site and building to avoid construction errors. If any work is performed by the Contractor or by his Subcontractors prior to adequate verification of applicable data, any resultant extra cost for adjustment of work to conform to existing limitations shall be borne by the Contractor without reimbursement or compensation by the Owner.

1.06 CONTROL POINTS AND LAYOUT:

- A. The initial lines, grades, and dimensions necessary for the location and control of the work under the Contract are shown on the Contract Drawings.
- B. The Contractor shall provide for himself all additional and supplementary lines and grades as may be necessary to layout the work and insure proper control of the work until completed. It shall be the Contractor's responsibility to satisfy himself as to the accuracy of all measurements before construction.

1.07 SUBSTANTIAL COMPLETION OF THE WORK:

- A. Upon substantial completion of any phase of the work, the Owner shall assume complete responsibility for the maintenance and operation of the heating, ventilating and air conditioning system and service utilities in that portion of the project.
- B. The Owner shall also become responsible for all other maintenance and damage and ordinary wear and tear and, with the exception of items under guarantee, the cost of repairs or restoration during the period between substantial and final completion.
- C. The Owner shall have the responsibility to have in effect all necessary insurance for protection against any losses not directly attributable to the Contractor's negligence.
- D. Upon substantial completion, payments for work in the substantially complete portion of the work shall be released to the Contractor, except for the retainage and an amount to cover the cost of the incomplete or deficient items included in the punch list made at the inspection to determine substantial completion. This amount shall be approximately the value of the punch list items as estimated by the Architect.

- E. The Contractor shall arrange a schedule so that punch list items are completed in the designated time by working during regular working hours. The Contractor shall be afforded access to the occupied portion of the building to perform this work during regular working hours.

1.08 ENVIRONMENTAL HAZARDOUS PRODUCTS, MATERIALS, WASTE:

- A. Do not incorporate in the Work hazardous materials or products as currently defined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or Environmental Protection Agency (EPA) regulations, rules, or requirements, as amended, unless the Contract Documents give no other option than to provide a material or product which contains a hazardous material, component, constituent, waste, or leachate. In studying the Contract Documents and carrying out the Work, report at once to the Designer the discovery of a product or material which contains hazardous materials, components, constituents, waste, or leachate.
- B. Do not incorporate in the Work a product or material which contains concentrations of a constituent, component, or material above the threshold levels which would require adherence to hazardous waste disposal regulations as currently defined, or could cause a release or threat of release of a hazardous substance at a level that would require a remedial response or removal action as currently defined by RCRA, CERCLA, or the EPA.
- C. Select materials and products meeting specified requirements which comply with EPA requirements as regards hazardous materials content. In making requests for substitutions, determine that materials and products proposed for substitution comply with RCRA, CERCLA, and EPA requirements.

1.09 BUILDING PRODUCTS USE:

- A. It is the responsibility of the Contractor to inform himself concerning the application of the products he uses to follow the directions of the Architect and manufacturer.
- B. In the event of disagreement between the Contract Documents and the manufacturer's directions, the Contractor will obtain written instructions from the Architect before proceeding with the installation.
- C. If the Contractor has knowledge of or reason to believe the likelihood of failure, he will transmit such knowledge to the Architect, and ask for written instructions before proceeding with the work.

1.10 OWNERSHIP OF REMOVED MATERIALS AND EQUIPMENT:

- A. All removed existing materials and equipment designated to be removed which are not to remain the property of the Owner or are not noted to be reused in the new work shall become the property of the Contractor and shall be removed from the premises and site and disposed of by him.

1.11 SEPARATE CONTRACTS:

- A. The Owner may award separate contracts in connection with the project. The work in any such separate contracts may proceed simultaneously with the execution of this Contract. The Contractor shall coordinate operations with any separate contractors. The Contractor will be required in the arrangement for the storage of materials and in the detailed execution of the work. The Contractor, including his subcontractors, shall keep himself informed of the progress and the detailed work of separate contractors and shall notify the Architect immediately of the lack of progress or defective workmanship that will interfere with his own operations. Failure of the Contractor to keep informed of the work progressing on the site and failure to give notice of lack

of progress or defective workmanship by separate contractors shall be construed as acceptance of him of the state of the work as being satisfactory for proper coordination with his own work.

- B. The separate contractors will provide competent foremen or supervisors for the installation of their equipment and they are to confer with the Contractor and his subs and other separate contractors where required in regard to connections and installations.

1.12 DISCRETIONARY FUND:

- A. The General Contractor shall include in the base bid an amount equal to **five percent (5%)** of the Base Bid amount which shall constitute a discretionary fund. This fund shall be used at the discretion of the Architect and the Owner. Upon completion of the work, the Contractor shall credit his final request for payment in the amount of all or any unused portion of this fund.

PART II PRODUCTS

NOT USED

PART III EXECUTION

NOT USED

End of Section

SECTION 01 16 00 - REGULATORY REQUIREMENTS

1PART I GENERAL

1.01 GENERAL:

- A. Where codes and standards are referenced in this and other sections of the specifications or on the drawings, whether or not a particular edition is referenced, it is the intention that these be the latest editions as adopted by the governing agency under whose jurisdiction the project is to be constructed. The latest edition shall be the edition in effect on the date approval is granted for construction to begin.

1.02 CODES:

- A. Work shall conform to the requirements of the building code indicated on the drawings. If no code is listed, work shall conform to the requirements of the building code in effect for the jurisdiction having authority.
- B. Work shall conform to the requirements of the life safety code indicated on the drawings. If no code is listed, work shall conform to the requirements of the life safety code in effect for the jurisdiction having authority.
- C. Plumbing and gas piping work shall conform to the requirements of the plumbing and gas codes indicated on the drawings. If no code is listed, work shall conform to the requirements of the plumbing and gas codes in effect for the jurisdiction having authority.
- D. Work shall conform to the requirements of the electrical code indicated on the drawings. If no code is listed, work shall conform to the requirements of the electrical code in effect for the jurisdiction having authority.
- E. Work shall conform to the requirements of the latest edition of ICC/ANSI A117.1 Standard on Accessible and Usable Buildings and Facilities.
- F. Work shall conform to the requirements of the latest edition of Americans with Disabilities Act (ADA).

1.03 CODE STANDARDS:

- A. Fire doors shall conform to requirements of NFPA No. 80, Standards for Fire Doors and Windows.
- B. Heating, ventilating and air conditioning work shall conform to requirements of NFPA NO. 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

1.04 REGULATIONS:

- A. Electrical work shall conform to applicable regulations of the State, Department of Insurance, Division of Fire Prevention and to applicable regulations of the Local Utility Company.
- B. Work shall be performed in a manner approved by the Occupational Safety and Health Administration. The Contractor shall be responsible for job-site safety and training of workman as required by Occupational Safety and Health Administration.

1.05 MATERIAL AND TESTING STANDARDS:

- A. Components of the work shall conform to requirements of American Society for Testing and Materials (ASTM) Standards, American National Standards Institute (ANSI) standards, and Trade Association Standards, as listed in the various other sections of the specifications.

1.06 MANUFACTURER'S RECOMMENDATIONS:

- A. When work in accordance with manufacturer's recommendations is specified, a copy of those recommendations shall be kept in the job office.

1.07 STORM WATER DISCHARGE PERMIT:

- A. If Construction Operations will disturb the ground, the Contractor must file a "Notice of Intent" for and obtain a National Pollutant Discharge Elimination System Permit from:

S
D
4
D
N

- B. Any fines levied because of the Contractor's failure to obtain the necessary permit will be the responsibility of the Contractor.

2PART II PRODUCTS - NOT USED

3PART III EXECUTION - NOT USED

End of Section

SECTION 01 21 00 - UNIT PRICES

PART I GENERAL

1.01 SCOPE:

- A. This section includes administrative and procedural requirements governing Allowances and Unit Prices.
- B. Allowances included on the drawings or in individual specification sections not specifically listed herein shall be bound by the procedures described herein. The Schedule of Allowances may not be a comprehensive list of all Allowances to be included in the Bid.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1 General Requirements apply to the work under this section.

1.03 ALLOWANCES:

- A. Types of allowances include the following:
 - 1. Unit Cost Allowances.
 - 2. Discretionary Fund Allowance.
- B. Selection And Purchases:
 - 1. At the earliest practical date after award of the Contract, advise the Architect of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
 - 2. At the Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
 - 3. Purchase products and systems selected by the Architect from the designated supplier.
- C. Submittals:
 - 1. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
 - 2. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.
 - 3. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit costs, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Contractor.
 - 4. Schedule: A "Schedule of Allowances" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials described under each Allowance.
- D. Discretionary Fund Allowance:
 - 1. Use the discretionary fund only as directed by the Architect for the Owner's purposes and only by Field Orders **Construction Change Directive (AIA Document G-714)** which indicate amounts to be charged to the allowance.

2. The Contractor's related costs for products and equipment ordered by the Owner under the discretionary fund are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
3. Field Orders **Construction Change Directive (AIA Document G-714)** authorizing use of funds from the discretionary fund will include Contractor's related costs and reasonable overhead and profit margins.
4. At Project closeout, credit unused amounts remaining in the discretionary fund to the Owner by Change Order.

E. Unused Materials:

1. Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.
2. When requested by the Architect, prepare unused material for storage by Owner where it is not economically practical to return the material for credit. When directed by the Architect, deliver unused material to the Owner's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

1.04 UNIT PRICES:

A. Definitions:

1. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modifications, if the estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Procedures:

1. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, profit, and applicable taxes.
2. Measurement and Payment: Refer to individual Specifications for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
3. Schedule: A "Unit Price" Schedule is included at the end of this section. Specification sections referenced in the "Schedule" contain requirements for materials described under each Unit Price.

PART II PRODUCTS

NOT USED

PART III EXECUTION

1.01 SCHEDULE OF UNIT PRICES:

A. Unit Price No. 1: Unsuitable soil:

1. Description: Removal of unsuitable soil and replacement with Engineered fill according to Section 31 20 00 Earth Moving.
2. Unit of Measurement: Cubic yard of soil removed.

- B. Unit Price No. 2: Rock Excavation in General Excavation:
1. Description: Removal of Rock in General excavation according to Section 31 20 00 Earth Moving.
 2. Unit of Measurement: Cubic yard of rock removed.
- C. Unit Price No. 3: Rock Excavation in Trench Excavation:
1. Description: Removal of Rock in Trench Excavation according to Section 31 20 00 Earth Moving.
 2. Unit of Measurement: Cubic Yard of Rock removed.
- D. Unit Price No. 4: Undercut Footings and Install Compacted Stone Fill.
1. Description: Undercut Earth in area of building foundations and install compacted stone fill according to Section 31 20 00 Earth Moving.
 2. Unit of Measurement: Cubic Yard of Earth removed.
- E. Unit Price No. 5: Reinforced Concrete Metal Building Footings
1. Description: Provision of Steel Reinforced Concrete Footings for Metal Building System according to Section 03 30 00 Concrete.
 2. Unit of Measurement: Cubic Yard of Footings installed.
- F. Unit Price No. 6: Geotextile fabric.
1. Description: Provide and install geotextile fabric above and below foundation drainage stone according to Section 31 20 00 Earth Moving.
 2. Unit of Measurement: Square Yard of Fabric installed.
- G. Unit Price No. 7: Foundation Drainage Stone.
1. Description: Provide and install foundation drainage stone according to Section 31 20 00 Earth Moving.
 2. Unit of Measurement: Ton of stone installed.

End of Section

SECTION 01 23 00 – ALTERNATES

PART I GENERAL

1.01 GENERAL:

- A Each bidder shall submit a proposal of the following described alternates in the space provided on the Bid Form. The work under the alternates shall conform to all applicable provisions of the drawings and specifications, except as specifically noted otherwise. The amounts quoted for alternates shall include the cost of all incidental omissions, additions, adjustments required because of each change, and the modification and/or removal of existing items as necessary for the new work. All items not specifically identified as alternate items shall be included in the Base Bid.

1.02 DEDUCT ALTERNATE "1":

- A If Alternate "1" is accepted, the material costs for all Finish Flooring will be removed from the bid and Clayton will furnish Flooring. Contractor shall provide a credit of _____ as described in the specifications as Alternate "1".

1.03 DEDUCT ALTERNATE "2"

- A If Alternate "2" is accepted, the material costs for all Lighting will be removed from the bid and Clayton will furnish Lighting. Contractor shall provide a credit of _____ as described in the specifications as Alternate "2".

PART II PRODUCTS

NOT USED

PART III EXECUTION

NOT USED

End of Section

SECTION 01 25 00 – SUBSTITUTION PROCEDURES

1PART I GENERAL

1.01 GENERAL:

- A This Section includes administrative and procedural requirements for submittal and approval of substitutions.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and other Division 1, General Requirements, apply to the work under this section.

1.03 DEFINITIONS:

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.04 SUBMITTALS:

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use facsimile of form provided in the Project Manual.
 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - i. Operational efficiency and energy consumption for equipment and appliances.

- e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations if requested, for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.05 QUALITY ASSURANCE:

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.06 PROCEDURES:

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS:

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 10 days prior to the date of the Bid. Requests received after that time may be considered or rejected at discretion of Architect.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction if applicable.
 - g. Requested substitution is compatible with other portions of the Work.

- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 EXECUTION - NOT USED

End of Section

SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION:

PART I GENERAL

1.01 COORDINATION OF WORK OF SUBCONTRACTORS:

- A. It is the responsibility of the Contractor to coordinate the work of his mechanical and electrical subcontractors. To this end the Contractor shall require that the mechanical and electrical subcontractors examine and familiarize themselves with the architectural and structural drawings as well as the mechanical and electrical drawings and that they frequently consult with each other and all other trades so that the work can be properly coordinated.
- B. The Contractor shall carefully check the work of his subcontractor in order to deliver to the Owner the contract work complete and properly installed in conformance with the Contract requirements.

1.02 CUTTING AND PATCHING:

- A. Cut and patch existing work that is to remain in place as necessary for the installation of new work.
- B. **It is the intention of the Contract that conduit, sleeves, thimbles, and chases for the mechanical and electrical work be installed in new concrete, masonry or stud wall work as the work progresses.** The mechanical and electrical subcontractors shall respectively install the required conduit, sleeves and thimbles in concrete forms and in masonry work and shall inform the Contractor of the size and location of any required chases to be formed in the concrete and masonry work. If this procedure is not followed, the mechanical and electrical subcontractors shall do all cutting of new concrete and masonry work required to install their work.
- C. Cutting of new work shall be held to the minimum necessary and shall be done neatly. The Contractor shall be responsible for the proper patching and finishing of all cut work whether or not cut by his own workmen or by subcontractors.
- D. Furr out walls or ceilings where necessary for the new work. Thicken walls as required to accommodate wall-mounted equipment including but not limited to electrical panel boxes, fire extinguisher cabinets, communications, security system, and fire alarm panels. Consult with the Architect about any furr outs not shown on the drawings to keep furr outs to a minimum.

1.03 PROJECT COORDINATION:

- A. Large Equipment: When possible, equipment which is to be installed in the building that may be too large to pass through doorways, shafts, or other restrictions shall be brought on the job and placed in the proper location before the enclosing structure is completed, otherwise, arrange with other Contractors to permit access at a later date, at no additional cost to the Owner.

PART II PRODUCTS

NOT USED

PART III EXECUTION

NOT USED

End of Section

SECTION 01 32 33 – DOCUMENTATION OF EXISTING CONDITIONS

1PART I GENERAL

1.01 SCOPE:

- A. Do all demolition work required to document condition of existing walls, paving, foundations, concrete slabs, existing underground piping, conduit, building finishes, doors, windows and any other items which may be affected by demolition and construction activities.
1. Minimum level of documentation shall include:
 - a. Preconstruction photographic documentation of:
 - i. All exterior walls
 - ii. Individual photographs of each window and door.
 - iii. Individual photographs of major architectural elements of the building (i.e. porches, offsets, cornices, copings, penthouses or other structures expected to be affected by the work.
 - iv. Individual photographs of mechanical and electrical equipment attached to or immediately adjacent to the building.
 - b. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.
 - i. Provide keyed notation of specific aspects of existing construction which might come into question concerning existing damage or soiled surfaces.
 - c. Construction Photographs: Submit two prints of each photographic view not less than 14 days prior to beginning work.
 - i. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte prints on 30 lb. Bond commercial-grade paper, allow a 1-inch- (25-mm-) wide margin and punched for standard 3-ring binder.
 - ii. Identification: On back of each print, provide an applied label or printed with the following information:

Name of Project.
Name and address of photographer.
Name of Architect
Name of Contractor.
Date photograph was taken if not date stamped by camera.
Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
Unique sequential identifier.
 - d. Digital Images: Submit a complete set of digital image electronic files with each submittal of prints on CD-ROM. Identify electronic media with date photographs were taken. Submit original image in its entirety, do not crop images.
- B. Contractors submitting proposals shall determine the quantities of documentation required by personal observation at the building and on the site.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A. Submit a demolition schedule to the Architect prior to execution of the work. Indicate proposed methods and sequence of operations. Include proposal for control of dust and noise, and coordination for shut-off, capping, and continuation of utility services.

1.04 COORDINATION:

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.05 USAGE RIGHTS:

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

1.06 PERIODIC CONSTRUCTION PHOTOGRAPHS:

- A. During the course of construction, document previously undocumented existing conditions which will be affected by demolition or construction activities prior to proceeding with the work in the area in question.
- B. If existing conditions are not documented and damage is observed, it will be construed as having been caused by demolition or construction activities of the Contractor and repair or remediation will be required at no additional cost to the Owner.

2PART 2 PRODUCTS

2.01 PHOTOGRAPHIC MEDIA:

- A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

3PART 3 EXECUTION:

3.01 CONSTRUCTION PHOTOGRAPHS:

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
 - a. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - i. Date and Time: Include date and time in filename for each image.
 - ii. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

- b. Preconstruction Photographs: Before commencement of demolition, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - i. Flag construction limits before taking construction photographs.
 - ii. Take photographs to show existing conditions adjacent to property before starting the Work.
 - iii. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - iv. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- c. Architect Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of , digital photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

End of Section

SECTION 01 32 50 – WEATHER DELAYS

1PART I GENERAL

1.01 DESCRIPTION:

- A. Work Included: Prepare and submit request for extensions of Time based on weather conditions.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not limited to General Conditions, Supplementary General Conditions and Sections in Division 1 of these Specifications.
 - 2. Applications for Payment.

1.02 EXTENSIONS OF CONTRACT TIME:

- A. If the basis exists for an extension of Time in accordance with Article 8, Paragraph 8.3 of the General Conditions and Supplementary General Conditions, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the average number of days experienced for the last five years.

1.03 ADVERSE WEATHER AND WEATHER DELAY DAYS:

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions, substantiated by NOAA data, which prevents exterior construction activity or access to the site within twenty-four (24) hours:
 - 1. Precipitation threshold (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure. Snow to liquid measure ration is 10:1.
 - 2. Standing snow is excess of one inch (1.00").
- B. Additional extension of Time may be granted for drying days following periods of two or more consecutive days of precipitation for the following conditions:
 - 1. At a rate of one day extension of Time for each period of two or more consecutive days of precipitation of 1.0 inch or more (liquid measure).
 - 2. Only if there is a hindrance to site access or site work, such as excavation, backfill and footings and the like and then only when no such work is performed.
- C. A Weather Delay Day may be counted only if adverse weather prevents work on the Project for fifty percent (50%) or more of the contractor's scheduled, critical path work, including a weekend day or holiday if Contractor has scheduled construction activity that day.

1.04 DOCUMENTATION AND SUBMITTALS:

- A. Contractor shall submit on a monthly basis daily job site work logs (daily reports) showing which, and to what extent, construction activities have been adversely affected by weather.
- B. Submit actual weather data, if requested by Architect to support claim for time extension, as obtained from NOAA weather reporting station in closest geographic proximity to the site or NOAA weather reporting station in nearest metropolitan airport.

- C. Compile and provide Base line Data when documenting actual delays due to weather in excess of the average climatic range.
- D. Organize claim and documentation to facilitate evaluation of a basis of calendar month periods, and submit in accordance with the procedures for Claims established in Paragraph 4.3 of the General Conditions.
- E. Extensions of Time requested by the Contractor and approved by the Architect on the basis of conditions stated above shall be acknowledged and communicated in writing to the Contractor periodically.
- F. For extensions of Contract Time granted, a modification shall be issued in accordance with the provisions of Article 7 of the General Conditions, and the applicable General requirements. Modifications for extensions of Time may be issued quarterly or held to the end of the Project as appropriate based on Architect's approval of such extensions as noted in E above.
- G. Extensions of Time not requested in a timely manner by the Contractor will not be granted at a later time.

2PART II PRODUCTS

NOT USED

3PART III EXECUTION

NOT USED

End of Section

SECTION 01 33 00 – SUBMITTALS

1 PART 1 GENERAL

1.01 GENERAL:

A. Work Included:

1. Wherever possible, throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
2. To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data and for its review or rejection by the Architect.
3. Shop drawings, product data and samples will be required for items listed hereinafter in the various sections of the specifications. The Architect reserves the right to request samples of proposed substitutions for materials or equipment specified whether or not samples of the materials and equipment specified are called for.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 DESCRIPTION OF REQUIREMENTS:

- A. The types of submittals controlled by these General Requirements include shop drawings, product data, samples and miscellaneous work-related submittals. The individual submittal requirements are specified in applicable section for each unit of Work.
- B. Definitions: the work-related submittals of this section, in addition to the definitions of the General Conditions and elsewhere in the Contract Documents for the requirements of administrative submittals.
1. **Shop drawings** include custom-prepared data of all forms including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form applicable to other projects.
 2. **Product data** includes standard printed information on materials, products and systems, not custom-prepared for this project, other than the designation of selections from available choices.
 3. **Samples** include both fabricated and unfabricated physical samples of materials, products and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.
 4. **Miscellaneous submittals** related directly to the Work (non-administrative) include warranties, guarantees, maintenance agreements, workmanship bonds, quality testing and certifying reports, copies of industry standards, record drawings, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work and not defined as shop drawings, product data or samples.

1.04 GENERAL SUBMITTAL REQUIREMENTS:

- A. Coordination and Sequencing: Coordinate the preparation and processing of submittals with the performance of the Work so that Work will not be delayed by submittals. Coordinate and sequence different categories of submittals for the same Work, and for interfacing units of Work, so that one will not be delayed for coordination with another. Do not proceed with purchasing, fabrication and delivery of work related to a submittal until submittal procedure has been successfully completed.
- B. Preparation of Submittals: provide permanent marking on each submittal to identify it by project, date, Contractor, subcontractor, submittal name and similar information to distinguish it from other submittals. Show Contractor's approval marking prior to Architect's design intent review. Package each submittal appropriately for transmittal and handling. Submittals which are received directly from sources other than through the Contractor's office will be returned "without action".
- C. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for error or omissions in the submittals by the Architect's approval thereof.
- D. Verbal discussion between the Contractor and the Owner or the Architect of a proposed deviation and any subsequent agreements thereto shall not be considered valid unless confirmed in writing by the Owner or the Architect.
- E. The Contractor shall direct specific attention, in writing or on resubmitted submittals, to revisions other than those requested by the Architect on previous submittals.
- F. Delivery: All submittals shall be accompanied by a letter of transmittal containing an enumeration and description of the submittals and, unless otherwise specified, shall be delivered to the Architect. **The transmittal letter shall indicate whether the submittal is for a product as specified; is a pre-approved substitution; or is a request for substitution offered with supporting documentation in accordance with the Contract Documents.**

Unless directed otherwise, all submittals shall be delivered to:

MBI Companies, Inc.
Attn: Michael Scott, AIA
299 N. Weisgarber Road
Knoxville, Tennessee 37919-4013

1.05 SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST:

- A. Within 30 days of receipt of a notice to proceed and prior to submitting any shop drawings or requests for payment, the Contractor shall submit a list of Subcontractors and Major Material Suppliers on the form provided in this Project Manual. The form shall list all Subcontractors and suppliers for the project providing material and or labor whose dollar value equals or exceeds Five Thousand dollars (\$5,000).

1.06 SCHEDULE OF VALUES:

- A. The schedule of values specified in Subparagraph 9.2.1 of the General Conditions shall be divided into not less than one line item for each section of the specifications (except Division 1 sections). Coordinate line items in the schedule of values with portions of the contract documents which identify units or subdivisions of work. Specifically, correlate with the project manual table of contents. Divide major subcontracts into individual cost items. Submit Schedule of Values within 20 days after execution of the Contract.

1. Where applications for payment are likely to include products purchased or fabricated but not yet installed, provide individual line items for material cost, installation cost, and other applicable phases of completion.
2. Provide separate line items for each allowance included in the Contract price.

1.07 APPLICATIONS FOR PAYMENTS:

- A. Applications for payments shall be submitted on AIA Document G702, Application and Certificate for Payment, supported by AIA Document G702A, continuation sheet, and by separate lists of materials stored at the site and materials stored off the site. Three (3) original notarized copies of Applications for Payment shall be submitted.

1.08 CONTRACTORS PROGRESS SCHEDULE:

- A. Prepare a fully developed, horizontal bar-chart type, contractor's progress schedule. Submit within twenty (20) days after the date established for Commencement of the Work.
- B. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the Schedule of Values.
- C. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.
- D. Prepare the schedule on a sheet or series of sheets, of paper of sufficient width to show data for the entire construction period.
- E. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
- F. Coordinate the Contractor's Progress Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
- G. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
- H. Revise the schedule monthly. Issue the updated schedule concurrently with the Application and Certification for Payment.

1.09 REVIEW OF DELEGATED ENGINEERING DOCUMENTS:

- A. Delegated Engineer: A professional engineer who undertakes a specialty service and provides services or creative work regarding a portion of the engineering project such as a fabricator or contractor so long as the engineer acts as an independent consultant or through a duly qualified engineering corporation. The delegated engineer is the engineer of record for that portion of the project.
- B. Documents prepared by a delegated engineer shall bear the name and business address of the delegated engineer on the engineering documents. When such documents are issued for preliminary or conceptual use, the engineer shall clearly note the intended purpose of such documents.
- C. Documents prepared by the delegated engineer shall be submitted to the engineer of record for review for compliance with engineering requirements and to confirm the following:

1. That the delegated engineering documents have been prepared by an engineer licensed and registered in the state of project construction.
2. That the delegated engineering documents of the delegated engineer conform with the intent of the engineer of record and meet the written criteria.
3. That the effect of the delegated engineer's work on the overall project generally conforms with the intent of the engineer of record.

1.10 SHOP DRAWINGS:

- A. General: See Paragraph 3.12 of the General Conditions for provisions pertaining to shop drawings.
- B. Preparation of Shop Drawings: Submit newly prepared information drawn accurately to scale sufficiently large to show all pertinent features of the item and its method of connection to the Work. **Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings.** Standard information prepared without specific reference to the Project is not a Shop Drawing. **Provide a space approximately 4 inches by 5 inches on the label or beside the title block on Shop Drawings to record the Architect's approval markings and recording action taken. Do not allow shop drawing copies without appropriate final review markings by the Architect or Engineer to be used in connection with the Work.**
- C. Identification: All submittals shall be clearly identified with the **name of the project, the supplier's name, the Contractor's name, and the location of material or equipment in the building. All shop drawings shall be dated and numbered.**
- D. Contractor's Review: Shop drawings submitted without evidence that they have been reviewed by the Contractor, as specified in Paragraph 3.12 of the General Conditions, or without proper identification as specified herein, will be returned to the Contractor without action by the Architect and shall be properly resubmitted. **When the phrase "by others" appears on a shop drawing, the Contractor shall indicate on the shop drawing who is to furnish the material or operation so noted, before submitting the drawing. By approving and submitting submittals, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.**
- E. Coordination of Submittals: Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including, but not limited to, the following procedures:
 1. Determine and verify all field dimensions and conditions, catalog numbers, and similar data.
 2. Coordinate as required with all Trades and with all public agencies involved.
 3. Secure all necessary approval from public agencies and others; signify by stamp or other means that all required approvals have been obtained.
 4. Clearly indicate, in writing, all deviations from the Contract Documents.
Additional copies of approved shop drawings shall be furnished as required for coordination of the work of the various trades.
- F. Number of Shop Drawings Required:
 1. One (1) hard-copy print and one electronic file copy of the entire submittal, shall be submitted of each submittal. The hard-copy shall be bound as a single entity for each submittal. ALL information present in the hard-copy, and no information absent from the hard-copy, shall be contained in a single electronic file as a single submittal.

2. After the submittal has been reviewed and stamped, a copy of the electronic file will be kept at the office of the Architect, a copy of the electronic file will be kept at the office of the Engineer.
 3. One (1) reviewed copy of the electronic file will be returned to the Contractor, from which he shall make as many hard-copies as he feels is needed for the prosecution of the Work.
 4. The Architect will not furnish additional copies to the Contractor.
- G. Architect's Review of Submittals: The Architect/Engineer shall review and approve or take other appropriate action on the Contractor submittals, such as shop drawings, product data, samples and other data, which the Contractor is required to submit, but only for the limited purpose of checking for conformance with the design concept and the information shown in the Construction Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. The Architect/Engineer's review shall be conducted with reasonable promptness while allowing sufficient time in the Architect/Engineer's judgment to permit adequate review. Review of a specific item shall not indicate that the Architect/Engineer has reviewed the entire assembly of which the item is a component. The Architect/Engineer shall not be responsible for any deviations from the Construction Documents not brought to the attention of the Architect/Engineer in writing by the Contractor. The Architect/Engineer shall not be required to review partial submissions or those for which submissions of correlated items have not been received.
1. The Architect shall provide 2 reviews of submittals as part of the scope of work. Additional reviews required by failure of the Contractor to make indicated corrections or submit an acceptable product will be billed to the Contractor at the Architect's standard hourly rate.
- H. Time Required for Architect's Review: Shop drawings shall be submitted in time to allow **not less than two weeks for processing by the Architect, plus an additional week for submittals requiring review by an engineer including mechanical, electrical, structural and civil engineering or those items requiring review by a consultant such as kitchen equipment, detention facility equipment and/or acoustical consultants.**
- 1.11 PRODUCT DATA:
- A. General: See Paragraph 3.12 of the General Conditions for provisions pertaining to shop drawings.
 - B. Collect the required data into one submittal for each material, product or system; and mark each copy to show which choices and options are applicable to the project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked, and special coordination requirements. Maintain one set of product data (for project site, available for reference by the Architect, Engineer or others).
 - C. The Architect will require a minimum of four (4) copies to be submitted of Product Data which has not been originally prepared on copyable material. The Architect will retain one copy, one copy will be retained by the Engineer and two copies will be returned to the Contractor. Therefore, if the Contractor desires more than two (2) copies with two copies returned to him, he must add to the minimum number of copies required to be submitted.
 - D. Information not exclusively pertinent to the Project shall be deleted so that there is no possible area of confusion as to what product, series or model is to be examined. The Architect or Owner will not take responsibility for having examined a product that was not intended by the Contractor to be judged.

1.12 SAMPLES AND MOCKUPS:

- A. Samples and mockups shall faithfully represent the product or the assembly as it is proposed to be installed. This shall include, but not be limited to, materials, finishes, method of construction or assembly, relationship to adjacent construction, method of attachment to adjacent construction, plus any electrical or mechanical connection that are required for the product or assembly to function. Include "range" samples (not less than 3 units) where variations occur, and identify each unit of each set.
- B. All samples shall have a label or tab containing the required information firmly affixed thereto.
- C. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in specified product submit accurate color charts and pattern charts to the Architect for his review and selection. Provide full sets of optional samples where Architect's selection is required. Prepare samples to match the Architect's sample where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.
- D. Samples and color charts shall be physical specimens of materials or colors proposed to be provided. Selections and approval of samples will be made by the Architect from these submitted samples and color charts, without increase in costs to the Owner or Architects. Should be Contractor desire a sample returned, he shall submit a sufficient number in order for the Architect to retain one (1) sample and return the remainder to the Contractor.
- E. In order for the Architect to make a color schedule as quickly as possible and to avoid delivery and pricing problems, the Contractor shall be required to submit all items that require a color selection within 40 days of the Notice to Proceed. Delivery and pricing problems that develop because an item was not submitted within the forty (40) day time limit, shall be the sole responsibility of the Contractor and not that of the Owner.
- F. The color selection on any one item will not be made until after samples of all items that require a color selection have been submitted.

1.13 ARCHITECT'S ACTION:

- A. The stamps of the Architect on returned shop drawings, product data and samples shall be interpreted as follows:
 - 1. Received: Acknowledges receipt. No action taken.
 - 2. Reviewed, No Exceptions Taken: No corrections. Proceed with the work.
 - 3. Furnish as Noted: May proceed with work as noted; shop drawings bearing this stamp must submit revised and resubmitted for record.
 - 4. Revise and Resubmit: No work shown shall be fabricated or furnished until shop drawings have been revised and resubmitted for further checking or approval.
 - 5. Rejected: Work shown is not in accordance with Contract requirements and is rejected. Make new submittals.
 - 6. Submit Specified Item: No substitutions permitted for this item. Make new submittals.

1.14 SUBMITTAL SCHEDULE:

- A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.
- B. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's
- C. Prepare the schedule in chronological order. Provide the following information for each submittal.

Scheduled date for the first submittal.
Related Section Number
Submittal category (Shop Drawing, Product Data, or Sample)
Name of the subcontractor
Description of the part of the Work covered
Scheduled date for Architect's final release or approval.

- D. Following approval of initial submittal, print and distribute copies to the Architect, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
- E. Revise the schedule monthly and issue the updated schedule concurrently with each Application and Certificate for Payment.

1.15 SUBMITTAL SEQUENCE:

- A. The right is reserved by the Architect to examine submittals and samples in a proper sequence that reflects the logical sequence of erection, installations, and proper assembly. Submittals of products or materials that are the responsibility of separate Trades yet must be assembled in conjunction one with another, shall be submitted at the same time so that they may be examined all together. Should these not be submitted simultaneously, the Architect reserves the right to hold one set while awaiting the arrival of other submittals.
- B. All submittals within the responsibility of one Trade must be submitted at one time together (i.e. millwork). Numerous submittals of one product or item of construction over a period of time is not acceptable. In the event of this occurrence, the Architect will hold the submittal data arriving first until the last of the material has arrived. Then, and only then, will he make his examination.

1.16 TIMING OF SUBMITTALS:

- A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittals, and for placing orders and securing delivery.
- B. Costs of delays occasioned by tardiness of submittals may be back-charged as necessary and shall not be borne by the Owner.

1.17 RECORD DRAWINGS:

- A. In addition to the record drawings specified in Paragraph 3.11 of the General Conditions, the Contractor shall assure that the record drawings for the mechanical, plumbing, fire protection and electrical work, as specified under Division 15 and 16 respectively, are properly maintained by his subcontractor and upon completion of the work shall deliver them to the Architect for the Owner.

1.18 CONTRACT CLOSE-OUT SUBMITTALS:

- A. As a precedent to final acceptance of the work and issuance of Certificate of Final Payment, including the Release of Retainage, certain submittals shall be made as specified in the various sections of the specifications. All such submittals shall be delivered to the Architect, in the form and number of copies specified, prior to or with the Contractor's request for final payment. Submittals shall include but not be limited to:
 - 1. General Contractor's Affidavit, Waiver and Release of Lien Statements and Consent of Surety, to final payment **as well as release of lien statements from all subcontractors and major material suppliers** as specified in Subparagraph 9.10.2 of the General Conditions. **These documents shall be addressed to the Owner and shall be**

original signed documents and not reproduced copies. Two (2) sets of these drawings shall be submitted.

2. Written guarantees and warranties as specified in the various other sections of the specifications.
3. Record drawings as specified in the General Conditions and in Divisions 15 and 16.
4. One copy of each final approved shop drawing submitted during the course of the project.
5. Three copies of operation and maintenance data for mechanical equipment and electrical equipment.
6. Letter stating that to the best of the Contractor's knowledge, no asbestos containing materials or other Work hazardous materials or products as currently defined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or Environmental Protection Agency (EPA) regulations, rules, or requirements, as amended
7. Contract Close-Out Submittals, except for record drawings, shall be submitted in commercial quality three ring binders with durable plastic covers. Identify the project on the face and side of the binders. Provide a cover sheet giving complete Project Title, Contractor's and Architect's name, address, phone number, name of project superintendent, and related general information. Include a Table of Contents to identify material in the Project Data Binders and a complete listing of subcontractors and material suppliers. Provide copies of all Certificates, Warranties and related documents as well as Product Data, Maintenance and Operation Data and related information required by the Contract Documents or furnished with items included in the Project. Two (2) sets of these documents shall be submitted.

End of Section

Submittal Cover Sheet

Submittal No.: _____

Contractor: _____

Date: _____

Phone: _____

Fax: _____

Project Manager: _____

Email: _____

Project Title: _____ Architect's Comm. No.: _____

Spec Section Title: _____ Section No.: _____

Sub / Supplier: _____ Phone: _____

YES ☐ NO ☐ **Product is as Specified**
If not as specified attach Substitution Request Form

Contractor's Review Stamp

Remarks: _____

SECTION 01 35 00 – SPECIAL PROJECT PROCEDURES:

1PART 1 GENERAL

1.01 PROGRESS SCHEDULE:

- A. In addition to the progress schedule required by the General Conditions, the Contractor shall also submit his proposed scheme of work for approval, describing proposed methods and sequences of work from beginning to completion of the work and their correlation with the Owner's requirements.
- B. When the Contractor's proposed sequence of work has been approved by the Owner, it shall become the time schedule for the work and shall be adhered to as closely as possible by both the Contractor and the Owner, except that mutually agreeable modifications may be made from time to time to meet unforeseen exigencies.

1.02 TIME OF PERFORMING WORK:

- A. Generally, the Contractor will be permitted to conduct his work in the building and on the premises during his regular working hours.
- B. The building must have the HVAC system operational and maintained at a constant temperature prior to installing any building finishes, except metal support systems.

1.03 OBSTRUCTIONS:

- A. All obstructions encountered during the construction of the Contract work shall be overcome by the Contractor by removal or alteration of work in place, by adjustments in the new work, or by temporary removal and reinstallation of existing work.

1.04 CLEANING UP:

- A. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- B. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- C. Exposed Surfaces in Finished Areas: Clean exposed surfaces
- D. Upon completion of the work, remove spots, stains, dirt, and dust from finished surfaces, both new and existing, including the surfaces of all existing machinery, equipment, and exposed piping that have been soiled by the construction. Protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- E. Clean and mop hard surface flooring and resilient flooring and vacuum clean carpet flooring
- F. Wash all glass and clean plumbing fixtures, lighting fixtures, and mechanical equipment.
- G. Comply with all special cleaning instructions contained in the various other sections of the specifications.
- H. Protect new and existing surfaces from the growth and spread of mold and mildew. If mold and mildew occur, notify Architect prior to proceeding. Retain qualified testing agency to document and direct remediation. Remediate or replace surfaces to stop the growth and spread of mold and mildew as deemed necessary by a qualified testing agency acceptable to the Contractor, Owner and Architect.

1. Pay for necessary testing and perform all abatement work required to remedy condition.

1.05 INSPECTION OF WORK IN PLACE:

- A. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities. The architect is to be given advanced notification for inspection of Structural, Mechanical, Plumbing, and Electrical work prior to said work being covered.
- B. Contractor shall give architect advanced notification for final inspection punch list prior to Owner occupying space.

1.06 SMOKING AND FIRE PRECAUTIONS

- A. No fire, or use of any fire, or explosion-producing tools or equipment will be permitted on the property
- B. This facility is a designated non-smoking facility. Smoking will not be permitted in the facility or within 20 feet of any entrance.

2PART 2 PRODUCTS

NOT USED

3PART 3 EXECUTION

NOT USED

End of Section

SECTION 01 40 00 – QUALITY CONTROL

PART 1 GENERAL

1.01 Quality Control is defined as testing and inspection performed by/or under the direction of the Contractor to ensure materials and construction meet the requirements of the Contract Documents and Specifications.

1.02 QUALITY CONTROL:

A. Quality Control tests and inspections consist of items identified in the Contract Documents and Specifications.

1.03 TESTS:

A. Engage inspection and test service agencies, including independent testing laboratories, which comply with “Guidelines for Effective Practice for Materials Engineering Laboratories” by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

B. Tests required to establish compliance with the Contract requirements for quality control shall be made by a testing agency acceptable to the Contractor, the Owner and the Architect with reports certified by the laboratory and furnished in duplicate to the Architect with a copy to the Contractor.

C. Representatives of the testing agency and monitoring shall have access to the work at all times. The Contractor shall provide facilities for such access and samples as necessary so that the testing agency may properly perform its function.

D. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to the following:

Name of testing agency or testing laboratory.

Dates and locations of samples and test or inspections.

Names of individuals making the inspection or test.

Complete inspection or test data.

Test results

Interpretations of test results.

Notation of significant ambient conditions at the time of sample taking and testing.

Comments or professional opinion as to whether inspected or tested work complies with requirements of the contract documents.

Recommendations on retesting, if applicable.

E. Non-Compliant Inspection/Test Results: Within 24 hours of inspection/test being performed, notify Architect/Engineer of-Record, and the Contractor of any non-conforming/non-compliant inspections/tests. Copies of successful retests of the originally non-conforming/non-compliant work shall be submitted to the Architect/Engineer-Of-Record and the Contractor.

F. Project Closeout: the Contractor shall certify to the Architect of Record that the required quality control services, as required by this section and the contract documents have been performed and that all results indicate compliance with requirements.

1.04 COST OF TESTS:

A. The cost of the services of the testing agency and monitoring shall be paid by the Contractor. When the tests indicate noncompliance with the Contract requirements, any subsequent and retesting occasioned by noncompliance shall be performed by the same testing agency and the costs shall be borne by the Contractor.

1.05 NOTIFICATIONS OF THE ARCHITECT:

- A. Notify architect within 24 hours before any work is completed for areas as described herein. If the architect is not notified as stated above and the contractor proceeds with the work, the architect shall have authority to direct the contractor to remove part or all of the installed materials at the contractor's expense for a detailed observation.
- B. The Architect shall be notified at the following points of work:
 - 1. Footing bottoms and concrete reinforcement prior to pouring any concrete.
 - 2. Waterproofing/Damp-proofing prior to any backfilling work.
 - 3. Water drainage test on sloped concrete floors prior to finish floor materials installed.
 - 4. Thru-wall flashing installation and mortar mix prior to installing any masonry.
 - 5. Completed structural steel erection before floor slabs are poured.
 - 6. Mechanical and Electrical systems above ceiling inspection prior to installation of finish ceiling material.
- C. The respective contractor and/or subcontractor shall correct any deficiencies that may be observed. Construction work observations or lack thereof by the architect does not relieve the contractor and/or subcontractor from any liability of faulty workmanship that may have occurred or may occur at a later date.

1.06 OTHER TESTS:

- A. See provisions of the General Conditions regarding tests required by governing authorities.
- B. The provisions of Divisions 22-23 and 26 for tests required for mechanical and electrical work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION:

- A. Upon completion of inspection, testing, sample taking, and similar services, repair damaged work and restore substrates and finishes to eliminate all deficiencies. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

End of Section

SECTION 01 45 00 – SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 GENERAL:

- A. Special Inspections is defined as third party testing and monitoring of materials and construction as identified in this section. Items requiring testing, inspection or monitoring that are not identified herein will be as required in Section 01 40 00.
- B. Conformance with the design intent of the contract documents shall be controlled by field testing during construction and laboratory testing prior to start of construction as specified in the various technical sections of this project manual and in accordance with the requirements of the Authority Having Jurisdiction (the Building Department)
 - 1. Special Inspection is the monitoring of the materials and workmanship critical to the integrity of the building structure. It is a review of the work of the contractor's and their employees to ensure that the approved plans and specifications are being followed and that the relevant codes and referenced standards are being observed. The Special Inspection process is in addition to the inspections conducted by the Building Department or Authority Having Jurisdiction.
 - 2. Certain Special Inspections are required by the Design Professional in Responsible charge. Additional Special Inspections may be required by the Building Department or Authority Having Jurisdiction. In these instances, the Building Department is the final determining entity as to the specific requirements for these Special Inspections.
 - 3. Contractors shall include in their price, any costs associated with coordination with the Special Inspector and Special Inspections Coordinator hired by the Owner. In the event that any Designer required testing is waived, a Change Order will be issued crediting the cost of those tests back to the Owner.

1.02 TESTS:

- A. The following tests/inspections will be performed as Special Inspections according to the requirements of Chapter 17 of the International Building Code, the tables and/or notes in the Contract Documents and items listed in the Specifications.
 - 1. Site Grading – all grading including building pad preparation
 - 2. Concrete – all concrete construction except sidewalks, mechanical/electrical pads
 - 3. Masonry Shearwalls
 - 4. Structural Steel
 - 5. EIFS Veneer
- B. Special Inspections will be conducted by a Third Party Agency retained by the Owner.
- C. Inspection and testing service agencies, including independent testing laboratories, shall comply with Qualifications of Inspectors and Testing Technicians as stated in the Statement of Special Inspections and "Guidelines for Effective Practice for Materials Engineering Laboratories" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.
- D. Reports shall be certified by the testing agency and furnished to the Special Inspections Coordinator and the Architect with a copy to the Contractor.
- E. Representatives of the testing agency and monitoring shall have access to the work at all times. The Contractor shall provide facilities for such access and samples as necessary so that the testing agency may properly perform its function.

- F. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to the following:

Name of the Jurisdiction having authority
Building Permit No.
Project title and address
Name of testing agency or testing laboratory.
Type of inspection performed
Dates and locations of samples and test or inspections.
Names of individuals making the inspection or test.
Complete inspection or test data.
Test results
Interpretations of test results.
Notation of significant ambient conditions at the time of sample taking and testing.
Comments or professional opinion as to whether inspected or tested work complies with requirements of the contract documents.
Itemization of items requiring corrective action.
Recommendations on retesting, if applicable.

- G. Non-Compliant Inspection/Test Results: Within 24 hours of inspection/test being performed, notify Architect/Engineer of-Record, and the Contractor of any non-conforming/non-compliant inspections/tests. Copies of successful retests of the originally non-conforming/non-compliant work shall be submitted to the Architect/Engineer-Of-Record and the Contractor.

- H. Project Closeout: the Special Inspector shall certify to the Professional in Responsible Charge that the required Special Inspections, as required by this section and the contract documents have been performed and that all results indicate compliance with requirements.

1.03 COST OF RETESTING:

- A. The cost of the services of the testing agency and monitoring shall be paid by the Owner. When the tests indicate noncompliance with the Contract requirements, any subsequent and retesting occasioned by noncompliance shall be performed by the same testing agency and the costs shall be borne by the Contractor.

1.04 NOTIFICATIONS OF THE ARCHITECT:

- A. Notify architect within 24 hours before any work is completed for areas as described in paragraph 2 below. If the architect is not notified as stated above and the contractor proceeds with the work, the architect shall have authority to direct the contractor to remove part or all of the installed materials at the contractor's expense for a detailed observation.

- B. The Architect shall be notified at the following points of work:

1. Footing bottoms and concrete reinforcement prior to pouring any concrete.
2. Waterproofing/Damp-proofing prior to any backfilling work.
3. Water drainage test on sloped concrete floors prior to finish floor materials installed.
4. Thru-wall flashing installation and mortar mix prior to installing any masonry.
5. Completed structural steel erection before floor slabs are poured.
6. Mechanical and Electrical systems above ceiling inspection prior to installation of finish ceiling material.

- C. The respective contractor and/or subcontractor shall correct any deficiencies that may be observed. Construction work observations or lack thereof by the architect does not relieve the contractor and/or subcontractor from any liability of faulty workmanship that may have occurred or may occur at a later date.

1.05 DUTIES AND RESPONSIBILITIES OF THE PARTIES:

A. Special Inspector:

1. Signify presence at jobsite. Special inspectors should notify contractor personnel of their presence and responsibilities at the jobsite. If required by the building official, they shall sign in on the appropriate form posted with the building permit.
2. Observe assigned work. The special inspector shall observe assigned work for conformance with the building department approved (stamped) design drawings and specifications and applicable workmanship provisions of the International Building Code. Architect/engineer reviewed shop drawings may be used only as an aid to inspection.
3. For continuous special inspection, the special inspector shall be on site at all times work is in process observing the work requiring continuous special inspection. Periodic inspections, if any, must have prior written approval based on a separate written plan reviewed and approved by the registered design professional in responsible charge. Periodic inspection is intended to mean that the inspector at periodic times inspects all work performed but is not required to "witness" the work being performed.
4. Report nonconforming items. The special inspector shall bring nonconforming items to the immediate attention of the contractor and note all such items in the daily report. If any item is not resolved in a timely manner or corrective action is not incorporated in the work, the special inspector shall immediately notify the building department by telephone or in person, notify the registered design professional in responsible charge and post a discrepancy notice. Any nonconforming items not corrected within 14 consecutive calendar days shall be issued to the Design Professional in Responsible Charge and the Building Department as a discrepancy notice.
5. Provide timely reports. The special inspector should complete written inspection reports for each inspection visit and provide the reports on a timely basis determined by the building official and to the Design Professional in Responsible Charge. The special inspector or inspection agency shall furnish these reports directly to the building official, registered design professional in responsible charge and others as designated. These reports should be organized on a daily format and may be submitted minimum weekly to the Design Professional in Responsible Charge and to the Building Official at his option.. Examples of daily and weekly report forms are included in Appendix A. These reports should include:
 - a. Description of daily inspections and tests made with applicable locations;
 - b. Listing of all nonconforming items;
 - c. Report on how nonconforming items were resolved or unresolved as applicable.
 - d. Itemized changes authorized by the architect, engineer and building official if not included in nonconforming items.
6. Submit final report. The special inspector or inspection agency shall submit a final signed report to the Design Professional and the building official stating that special inspection and testing requirements were fulfilled and reported and, to the best of his/her knowledge, in conformance with the approved design drawings, specifications, approved change orders and the applicable workmanship provisions of the International Building Code. Items not in conformance, unresolved items or any discrepancies in inspection

coverage (i.e., missed inspections, periodic inspections when continuous were required, etc.) shall be specifically itemized in this report.

B. Owner:

1. The project owner, the Registered Design Professional in responsible charge or other entity as an agent of the owner is responsible for employing special inspection services. The special inspector/agency shall not be in the employ of the contractor, subcontractor or material supplier (see IBC Section 1704.1). In the case of an owner/contractor, the special inspector/agency shall be employed as specified by the building official.

C. Registered Design Professional in Responsible Charge:

1. Prepare special inspection program. The registered design professional in responsible charge shall list the items for which special inspection is required and shall indicate which, if any, items for which the IBC or the building official approves periodic inspection and the frequency of such inspection.
2. Respond to field discrepancies. The registered design professional in responsible charge shall respond to discrepancy notices issued by the special inspector.
3. Review shop drawings and submit design changes. The registered design professional in responsible charge shall acknowledge and approve shop drawings that may detail structural information, shall submit to the building official and to the special inspection agency written approval of any verbally approved deviations from the approved plans and shall submit revised plans for building official approval as required.

D. Special Inspections Coordinator:

1. Keep records on file of all inspections.
2. Furnish copies of inspection reports to the Building Official and the Registered Design Professional in Responsible Charge.
3. Verify acknowledgement by the Contractor for correction, of discrepancies reported by special inspectors.
4. If discrepancies reported by the Special Inspector are not corrected, verify reporting to the

E. Contractor:

1. Notify the special inspector. The contractor is responsible for notifying the special inspector or agency regarding individual inspections for items listed on the attached schedule and as noted on the building department approved plans. Adequate notice shall be provided so the special inspector has time to become familiar with the project.
2. Provide access to approved plans. The contractor is responsible for providing the special inspector access to approved plans.
3. Advise testing agency in advance of operations to allow for the assignment of testing personnel and testing.
4. Furnish labor to assist testing agency in obtaining and handling samples at the job site. Provide and maintain for the use of the testing agency adequate facilities for proper curing and storage of test specimens on the project site.
5. Retain special inspection records. The contractor is also responsible for retaining at the jobsite all special inspection records completed by the special inspector upon request.

F. Building Department:

1. Approve special inspection program. The building department will approve all special inspectors and special inspection requirements.
2. Enforce special inspection. Work requiring special inspection and the performance of special inspectors may be monitored by the building inspector. His/her approval must be obtained prior to placement of concrete, covering of structural steel or other similar activities in addition to that of the special inspector.
3. Review inspection reports. The building official should review special inspection progress and final reports.
4. Perform final inspection. The building official should perform the final inspection and approval for a project after the final special inspection report has been reviewed and approved.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION:

- A. Upon completion of inspection, testing, sample taking, and similar services, repair damaged work and restore substrates and finishes to eliminate all deficiencies. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

End of Section

SECTION 01 50 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 UTILITIES SERVICES FOR CONSTRUCTION PURPOSES:

- A. The Contractor shall provide all necessary temporary utilities as required for construction purposes. The utility costs will be paid by the Contractor.
- B. The Contractor shall furnish and install all temporary piping and wiring required for the use of these services during construction and upon completion of the work shall remove such temporary piping and wiring.
- C. The use of existing services shall be in such a manner and by such methods that will not interrupt the services to any of the Owner's facilities that are to remain in operation during construction.

1.02 BARRICADES AND SPECIAL CONTROLS:

- A. Provide temporary barriers, fences, and warning signs around the sites of new buildings to control access of unauthorized persons to work areas, and as required by law. Special care shall be taken to provide adequate barriers and warning signs to prevent access of unauthorized persons to work areas where hazardous work is being performed.
- B. Provide temporary barriers and warning signs at excavations that might be left open during nonworking hours, including warning lights at night.

1.03 CONSTRUCTION AIDS:

- A. Provide necessary staging, scaffolding, and hoisting equipment and temporary walkways and ladders required for installation of the work under the Contract.

1.04 TEMPORARY BUILDINGS:

- A. Provide temporary field office and storage sheds as required to carry on the work. Adequate space shall be provided in the field office for convenient use and storage of Contract Drawings and Specifications, approved shop drawings, samples, and field records. Truck trailers may be used for temporary field office and storage enclosures.
- B. Upon completion of the work, all temporary buildings shall be removed and the area of the site that they occupied shall be restored to its condition at the commencement of work under the Contract.

1.05 SANITARY FACILITIES:

- A. Provide adequate temporary toilet facilities for the use of workmen, conforming to applicable laws, ordinances, and governmental regulations.
- B. Upon completion of the work, temporary toilet facilities shall be removed from the site.
- C. Provide temporary sanitary facilities for use of the Building Occupants during the course of construction during time existing sanitary facilities have been removed from service and before new facilities are available for use of building occupants.
 - 1. Provide separate portable toilets for men and women.
 - a. Service portable toilets weekly at a minimum during the time they are in service.

1.06 TEMPORARY ENCLOSURES:

- A. Provide temporary weathertight closures for all exterior openings after walls and roof of the new building are constructed when it is necessary to protect the work from the weather and to permit the use of temporary heat. Provide weathertight and security protection of the existing building until what time as the new construction is able to provide weathertightness and security. Provide safety barriers as required to protect the occupants of the building.
- B. Water Protection: Provide at all items for protection of excavation, trenches, and building from damage by rain water, spring water, ground water, backing up of drains or sewers, and all other water. Provide all pumps, equipment, temporary drains or dams, and enclosures necessary to provide this protection.

1.07 TEMPORARY HEAT AND VENTILATION:

- A. Provide temporary heat and ventilation as necessary for protection and drying out of the work and to allow work to be prosecuted in cold weather.
- B. Heat shall be provided by means of approved temporary heating equipment which in installation and operation will not damage the work. Provide adequate and proper fuels and all services required to furnish heat as required. Salamanders shall not be used inside the building. Heaters used to dry out or protect freshly placed concrete shall be of a type and shall be so ventilated as to prevent carbon dioxide from damaging concrete.
 - 1. After the construction of the building has reached a point where the permanent heating and cooling systems are operable, the Contractor may use the permanent heating and cooling equipment for temporary heating and cooling. The heating and cooling systems shall not be used for temporary heat and cooling until the building is broom clean and shall not be used without all filters in place. Upon the completion of the work, all ducts and equipment shall be internally cleaned and all filters shall be replaced with new filters.
 - a. If permanent HVAC system for temporary use during construction is used, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00.
 - 2. Contractor shall pay the hourly rate of the Engineer's and Testing and Balancing Agent's technical personnel to observe and document the condition of equipment and ductwork (30 minutes average per unit) used for construction term temporary heating and cooling. Engineers inspection of heat transfer coils must be complete prior to start-up, test and balance, and final acceptance. All warranties shall begin upon final acceptance by the Owner, not beneficial usage by the Contractor.
- C. Costs of providing temporary heat shall be borne by the Contractor.

1.08 BULLETIN BOARD AND JOB SIGN:

- A. On or near the field office, the Contractor shall install a bulletin board upon which to post legally required notices. The bulletin board shall be of adequate size to contain all required notices and be so constructed as to protect the postings from obliteration by the weather.
- B. The Architect shall provide one painted sign stating the Architect (Michael Brady Inc.). Location of sign shall be as directed by the Architect. The Contractor shall erect a substantial wood frame to support the sign provided by the Architect.
- C. Maintain all bulletin boards and job signs in good condition from start to completion of the work.

1.09 RODENT AND VERMIN CONTROL:

- A. Provide on the project site ample and suitable refuse containers with covers. The Contractor shall be responsible for containing and removing from the site all refuse from meals eaten on the site and other rodent or vermin attracting refuse.
- B. During the construction period precaution shall be taken as necessary to control the entry and breeding of rodents and vermin in the new building.
- C. If, within three months after occupancy of the building, the building is found to be infested by rodents or vermin, the Contractor shall bear the cost of extermination.

1.10 REMOVAL OF CONSTRUCTION DEBRIS:

- A. Provide suitable containers for and maintain regular a regular schedule for the removal of debris and rubbish from the construction site and surrounding area.
- B. Pay all container rental fees, hauling, and landfill costs associated with the removal of debris and rubbish from the site.

1.11 PROTECTION:

- A. Weather Protection: Provide at all times protection against rain, wind, storms, frost, or heat so as to maintain all work, materials, equipment and fixtures free from injury or damage. At end of days work, all new work likely to be damaged by weather conditions shall be covered.
- B. Water Protection: Provide at all times protection of excavation, trenches, and building from damage by rain water, spring water, ground water, backing up of drains or sewers, and all other water. Provide all pumps, equipment, temporary drains or dams, and enclosures necessary to provide this protection.
- C. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- D. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

- E. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

- 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
- 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
- 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

1.12 TELEPHONE:

- A. Install a single party telephone or a cellular phone and a facsimile machine or computer capable of sending and receiving email in the field office. The telephone shall be available for use by all persons concerned with the construction of the project and service shall be maintained from start to completion of the work. The cost of the telephone service shall be paid by the Contractor.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

End of Section

SECTION 01 60 00 – PRODUCT REQUIREMENTS:

1PART 1 GENERAL

1.01 STORAGE OF MATERIALS AND EQUIPMENT:

- A. Storage of materials and equipment, location of field office, space for truck deliveries and parking of workmen's cars shall be restricted to areas of the site mutually agreed upon by the Contractor and the Owner prior to commencement of construction.
- B. Storage of materials and equipment and truck deliveries shall not interfere with normal pedestrian and vehicular traffic.
- C. Upon completion of the work, all damage to existing ground cover, paving, site improvements, or existing structures resulting from the storage of materials and equipment, construction vehicular traffic, or other construction operations under the Contract shall be repaired by the Contractor to its condition at commencement of work under the Contract.

1.02 PROTECTION OF MATERIALS AND EQUIPMENT:

- A. Material and equipment stored on the site that are to be incorporated in the work shall be adequately protected from damage by the weather or by construction operations.
- B. Materials subject to damage by water shall be blocked off the ground and protected with waterproof coverings, stored in weathertight floored sheds or in the building after it is enclosed.
- C. Material that is subject to damage by soiling or by exposure shall be stored as to prevent physical damage to the materials and equipment.
- D. Materials and equipment shall be so transported, handled, and stored as to prevent physical damage to the materials and equipment.

1.03 SUBSTITUTIONS:

- A. All materials and equipment incorporated in the work shall be new and as specified, except such substitutions that are approved as provided by the provisions for substitutions set forth in the Supplementary Conditions.
- B. Where substitutions are implemented, the Contractor shall be responsible for insuring that:
 - 1. The proposed substitution does not affect dimensions shown on Drawings.
 - 2. He will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.
 - 3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
 - 4. Maintenance and service parts will be locally available for the proposed substitution.

2PART II PRODUCTS

NOT USED

3PART III EXECUTION

NOT USED

End of Section

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.02 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Section "02 41 16 Demolition" for demolition of selected portions of the building.
 - 2. Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 3. Division 07 Section "Firestopping" for patching fire-rated construction.

1.03 DEFINITIONS:

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.04 SUBMITTALS:

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least **10** days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.05 QUALITY ASSURANCE:

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-suppression systems.
 4. Mechanical systems piping and ducts.
 5. Control systems.
 6. Communication systems.
 7. Conveying systems.
 8. Electrical wiring systems.
 9. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.06 WARRANTY:

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.01 MATERIALS:

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.01 EXAMINATION:

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.03 PERFORMANCE:

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

End of Section

SECTION 01 77 00 – CONTRACT CLOSEOUT:

1PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Closeout procedures.
- B. Owner's Operating Instruction Session.
- C. Adjusting.
- D. Operation and Maintenance Data.
- E. Project record documents.
- F. Warranties

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBSTANTIAL COMPLETION:

- A. Notify the owner not less than twenty-one (21) days prior to the date of substantial completion to allow notification of tenants.
- B. Submit written certification to Architect that Project, or designated portion of Project, is substantially complete. Include a list of items to be completed or corrected as a result of his inspection of the work.
- C. Submit the Certificate of Occupancy issued by the local building authority to the Architect for forwarding to the Owner.
- D. The Architect will make an inspection within seven (7) days after receipt of certification, together with Owner's Representative.
- E. Should the Architect consider the work substantially complete:
 - 1. The Contractor shall prepare, and submit to the Architect, a list of items to be completed or corrected, as determined by the Architect's inspection.
 - 2. The Architect will prepare and issue a certificate of substantial completion, AIA document G704, complete with signatures of Owner, Contractor, and Architect, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect.
 - 3. The Owner will occupy the project, under provisions stated in certificate of substantial completion.
 - 4. The Contractor will complete work listed for completion or correction, within the designated time.
 - 5. Refer to Supplementary Conditions Article 9.10.6 for failure to complete in a timely manner.
- F. Should the Architect consider that the Work is not Substantially Complete:

1. He shall immediately notify Contractor, in writing stating reasons.
2. The Contractor shall complete the Work, and send second written notice to the Architect, certifying that the project or designated portion of project, is substantially complete.
3. The Architect will reinspect the work at the Contractor's expense.

1.04 OWNER'S OPERATING INSTRUCTION SESSION:

- A. Conduct training session for Owner's designated personnel covering various mechanical, electrical, and other operating features for familiarization with the physical plant equipment and operation. One copy of the required (see various technical sections on project closeout) mechanical operations manual shall be on hand during this session along with the mechanics familiar with all equipment. These mechanics shall have on hand such tools and/or equipment to reveal controls and mechanic access areas. The instruction session shall be scheduled for a full day but in no case less than the minimum time required to review each type of equipment/operation. The minimum areas of instruction shall be:
1. Location and operation of project site water valves, meters and other operational equipment.
 2. Location and operation of project electrical disconnects.
 3. Operation of sewage handling facilities.
 4. Sprinkler valves, alarms, test and operation.
 5. Project landscape irrigation operation.
 6. Project Site lighting operation/maintenance.
 7. Storm sewer operation/configuration.
 8. Refuse containment areas.
 9. Roof maintenance/warranty considerations. Traffic cautions.
 10. HVAC unit operations/maintenance (filters and thermostats, boiler and/or cooling tower maintenance).
 11. Interior lighting, lamp and ballast replacement.
 12. Keying and lock operations.
 13. Locations and use of required replacement finish materials such as floor and ceiling tiles and panels.
 14. Notification procedures for Contractor warranty work.
- B. Video Tape Owner's Instruction Session and provide two (2) copies on DVD to Owner as part of Close Out Documentation.

1.05 CLOSEOUT PROCEDURES AT FINAL COMPLETION:

- A. As a precedent to final acceptance of the work and issuance of Certificate of Final Payment, including the Release of Retainage, certain submittals shall be made as specified in the various sections of the specifications. All such submittals shall be delivered to the Architect, in the form

and number of copies specified, prior to or with the Contractor's request for final payment. Submittals shall include but not be limited to:

1. General Contractor's Affidavit, Waiver and Release of Lien Statements and Consent of Surety, to final payment as well as release of lien statements from all subcontractors and major material suppliers as specified in Subparagraph 9.10.2 of the General Conditions. These documents shall be addressed to the Owner and shall be original signed documents and not reproduced copies. Two (2) sets of these drawings shall be submitted.
 2. Written guarantees and warranties as specified in the various other sections of the specifications.
 3. Record drawings as specified in the General Conditions and in Divisions 15 and 16.
 4. One copy of each final approved shop drawing submitted during the course of the project.
 5. Three copies of operation and maintenance data for mechanical equipment and electrical equipment.
 6. Letter stating that to the best of the Contractor's knowledge, no asbestos containing materials or other Work hazardous materials or products as currently defined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or Environmental Protection Agency (EPA) regulations, rules, or requirements, as amended
 7. Contract Close-Out Submittals, except for record drawings, shall be submitted in commercial quality three ring binders with durable plastic covers. Identify the project on the face and side of the binders. Provide a cover sheet giving complete Project Title, Contractor's and Architect's name, address, phone number, name of project superintendent, and related general information. Include a Table of Contents to identify material in the Project Data Binders and a complete listing of subcontractors and material suppliers. Provide copies of all Certificates, Warranties and related documents as well as Product Data, Maintenance and Operation Data and related information required by the Contract Documents or furnished with items included in the Project. Two (2) sets of these documents shall be submitted.
- B. Submit written certification that the Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for final inspection by Owner and Architect.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.
- 1.06 WARRANTIES:
- A. Provide notarized copies.
 - B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
 - C. Provide Table of Contents and assemble in three D side ring binders with durable plastic covers. Note: This is in addition to copies of warranties provided with operation and maintenance binders.
 - D. Submit prior to final Application for Payment.

- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as warranty period.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

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

End of Section

SECTION 01 77 10 – CLEANING

1 PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: Throughout the construction period, maintain the roof buildings and site in a standard of cleanliness as described in this section.
- B. Related Work Described Elsewhere: In addition to standards described in this section, comply with all requirements for cleaning up as described in various other sections of these specifications.

1.02 QUALITY ASSURANCE

- A. Inspection: Conduct inspection daily, and more often if necessary, to verify that requirements for cleanliness are being met.

2 PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

- A. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

- A. Use only cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the A/E.

3 PART 3 EXECUTION

3.01 PROGRESS CLEANING

- A. General:
 - 1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
 - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for the construction of this work.
 - 3. At least once a day and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
 - 4. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the ecology.
- B. Site:
 - 1. Daily and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
 - 2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restock, tidy, or otherwise service all arrangements to meet the requirements of 3.01.A.I, above.
 - 3. Maintain the site in a neat and orderly condition at all times. Use a magnet to remove small metal objects such as nails, fasteners, etc.
- C. Structures:
 - 1. The Contractor will be responsible for maintaining the existing level of cleanliness on any interior areas used by subcontractors or employees.

End of Section

SECTION 01 77 23 – FINAL CLEANING

1PART 1 GENERAL

1.01 GENERAL:

- A. General cleaning of construction debris is required by General Conditions and included in Section 01 77 10 Cleaning.

1.02 CLEANING:

- A. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - 1. Remove labels that are not permanent labels.
 - 2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - 3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces. Mop and polish resilient flooring.
 - 4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - 5. Not more than 4 days before date scheduled for final inspection, clean flooring according to manufacturer's recommendations. Strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer. After cleaning, reapply polish to floor surfaces to restore protective floor finish and buff according to flooring manufacturer's written recommendations. Coordinate with Owner's custodial personnel and use Owner's selected materials for sealing and polishing floors.
 - 6. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.03 REMOVAL OF PROTECTION:

- A. Remove temporary protection and facilities installed for protection of the Work during construction.

1.04 COMPLIANCE:

- A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

- B. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

2PART 2 PRODUCTS

NOT USED

3PART 3 EXECUTION

NOT USED

End of Section

SECTION 02 41 16 – DEMOLITION

PART I GENERAL

1.01 GENERAL:

- A. Obtain all required demolition permits from the local jurisdiction.
- B. Do all demolition work required to remove existing masonry walls, paving, foundations, concrete slabs, existing underground piping, conduit, building finishes, doors, windows and any other necessary items to install the new work.
- C. Contractors submitting proposals shall determine the quantities of demolition work required by personal observation at the building and on the site.
- D. Occupancy: The Owner may occupy any existing facilities adjacent to areas of selective demolition. Conduct selective demolition work in a manner that will minimize need for disruption of the Owner's normal operations. Provide minimum of 72 hours advance notice to the Owner of demolition activities that will impact normal operations at any facility.
- E. Condition of Structures: Every effort has been made to indicate existing site improvement and building conditions on the drawings, however, Owner assumes no responsibility for actual condition of items or structures to be demolished.
 - 1. Conditions existing at time of commencement of the contract will be maintained by the Owner insofar as practicable.
- E. Partial Demolition and Removal: Items indicated to be removed, but of salvageable value to Contractor, may be removed as work progresses. Transport salvaged items from site as they are removed. Items indicated to be removed and reused shall remain the property of the Owner.
 - 1. Storage or sale of removed items on the site will not be permitted.
- F. Protections: Provide temporary barricades and other forms of protection as required to protect The Owner's personnel and general public from injury due to selective demolition work.
 - 1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of existing buildings.
 - 2. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 - 3. Protect existing floors with suitable coverings when necessary.
 - 4. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or excessive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
 - 5. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 - 6. Remove protections at completion of work.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A. Submit a demolition schedule to the Architect prior to execution of the work. Indicate proposed methods and sequence of operations. Include proposal for control of dust and noise, and coordination for shut-off, capping, and continuation of utility services.
- B. Submit schedule indicating proposed sequence of operations for selective demolition work to Architect for review prior to start of work. Include coordination for shutoff, capping and continuation of utility services as required, together with details for dust and noise control.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

1.04 JOB CONDITIONS:

- A. Maintain temporary barricades for protection of job personnel and the public. Remove barricades when no longer required.
- B. Promptly repair any damages caused by demolition work, at no extra cost to the Owner.
- C. Conduct operations in such a manner as to minimize interference with use of public ways and adjacent used facilities. Do not close, block or otherwise obstruct use of public ways or facilities without written consent of authorities having jurisdiction. Provide alternate routes to closed or obstructed facilities as required by local regulations.

1.05 EXPLOSIVES:

- A. The use of explosives is not required by the scope of the work and is strictly prohibited.

1.06 UTILITY SERVICES:

- A. Existing utilities indicated to remain shall be kept in service and protected from damage during demolition operations.
- B. Do not interrupt existing utilities serving used or occupied facilities unless authorized in writing by authorities having jurisdiction. If interruption is allowed, provide alternate temporary services acceptable to governing authorities.
 - 1. Do not interrupt utilities serving occupied or used facilities, except when coordinated and authorized by the Owner. Provide temporary services during interruptions to existing facilities, as acceptable to the Owner
 - 2. Maintain fire protection services during selective demolition operations.

1.07 ENVIRONMENTAL CONTROLS:

- A. To the greatest extent practicable, limit the spread of dust and dirt through the use of water sprinkling, enclosures and other suitable methods. Comply with governing regulations with respect to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART II PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART III EXECUTION:

3.01 PREPARATION:

- A. Inspection: Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions of structure surfaces, equipment, or surrounding properties that could be misconstrued as damage resulting from selective demolition work; file with Architect prior to starting work.
- B. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
- C. Locate, identify, shut off, cap, and disconnect utilities indicated to be removed.
 - 1. Provide by-pass connections as required to maintain services to adjacent properties and facilities.
 - 2. Provide a minimum of 72 hours advance notice to the Owner if shut-down of services is required during change-over.

3.02 DEMOLITION:

- A. Perform demolition work in a systematic manner. Use such methods as necessary to perform work indicated on drawings and in compliance with schedule and governing authorities.
 - 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools. Do not use power-driven impact tools unless coordinated with and approved by the Owner so as to not disrupt the Owner's regular operations due to excessive noise and vibration.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without delay.
- C. Provide effective safeguards against air & water pollution in compliance with governing authorities.
- D. Completely fill below-grade depressions and voids with approved fill materials free of roots, stones larger than 3" in diameter, and other deleterious or organic substances.

3.03 SALVAGE & DISPOSAL:

- A. Historic artifacts, including cornerstones, their contents, commemorative plaques and tablets, antiques, and other articles of historic significance shall remain the property of the Owner. Notify Owner's representative if such articles are encountered; obtain approval regarding method of removal. Salvage such articles and turn over to Owner.
- B. Remove debris, rubbish, and other substances from the site. Legally transport and dispose of such materials off-site in a permitted disposal facility. Provide documentation that provides record of the permitted landfill where the demolition material has been disposed.
- C. If hazardous materials are encountered, comply with applicable regulations in handling, removing, and protecting against exposure or environmental pollution.
- D. Burning of removed materials on the project site is forbidden.

End of Section

SECTION 03 30 00 – CONCRETE WORK

PART I GENERAL

1.01 SCOPE:

- A. The extent of concrete work is shown on the drawings.

1.02 SUBMITTALS:

- A. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing and sealing compounds, and others requested by the Architect.
- B. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315, Details and Detailing of Concrete Reinforcement, showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Show on the shop drawings special reinforcement required and openings through concrete structures.
- C. Submit two (2) copies of laboratory test reports with standard deviation analysis or trial batch data. All concrete materials shall be listed.

1.03 QUALITY ASSURANCE:

- A. Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.
 - 1. ACI 301, Specifications for Structural Concrete for Buildings
 - 2. ACI 302, Guide for Concrete Floor and Slab Placement
 - 3. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
 - 4. ACI 305, Hot Weather Concreting
 - 5. ACI 306, Cold Weather Concreting
 - 6. ACI 315, Detailing Manual
 - 7. ACI 318, Building Code Requirements for Reinforced Concrete
 - 8. ACI 347, Recommended Practice for Concrete Formwork
 - 9. CRSI Manual of Standard Practice
 - 10. ACI 211.1 Standard Practice for Selecting proportions for Normal, Heavyweight, and Mass Concrete.
 - 11. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
- B. The Contractor is responsible for correcting concrete work that does not conform to the specified requirements, including requirements for strength, tolerances, and finishes.

1.04 QUALITY CONTROL AND TESTING:

- A. Materials and operations shall be inspected and tested as work progresses. Failure to detect defective work shall not prevent rejection when defect is discovered, nor shall it obligate the Owner for final acceptance.
- B. If indicated as required by Section 01 40 00 and/or 01 45 00, Special Inspectors shall meet the "Qualifications Standards of Inspectors and Testing Technicians" noted in the Statement of Special Inspections.
- C. Testing agencies shall meet the requirements of "Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction," ASTM E 329.

D. The following testing service shall be performed by the designated party identified in Sections 01 40 00 and/or 01 45 00.

1. Secure composite samples in accordance with "Standard Method of Sampling Fresh Concrete," ASTM C 172.
2. Mold and cure three specimens from each test required in accordance with "Standard Method of Making and Curing Concrete Test Specimens in the Field," ASTM C 31.
3. Test specimens in accordance with "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens," ASTM C 39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information.
4. Make one strength test for each 100 cu. yd. (76.5 m³) or fraction thereof, of each mix design of concrete placed in any one day.
5. Determine slump of normal-weight concrete sample for each strength test in accordance with "Standard Test Method for Slump of Portland Cement Concrete," ASTM C 143.
6. Determine total air content of normal-weight concrete sample for each strength test in accordance with "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method," ASTM C 231 or "Standard Test Method for air content of freshly mixed concrete by the Volumetric Method," C-173.
7. Determine temperature, unit weight, yield and air content (gravimetric) of concrete sample for each strength test in compliance with ASTM C 138, "Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete."
8. If water is added at the site, the designated agency shall retest the concrete in accordance with "Standard Test Method for Slump of Portland Cement Concrete" plus whatever other tests the designated agency feels are necessary. No water will be added at the site without the approval of the designated agency.
9. Qualification of proposed materials and the establishment of mix designs in accordance with "Building Code Requirements for Reinforced Concrete," ACI 318.
10. Non-Compliant Test Reports: All test reports indicating non-compliance should be faxed immediately to all parties on the test report distribution list. Copies shall be on different colored paper.
11. Test results will be reported to the Architect and Contractor in writing on the same day that the test is made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, and compressive breaking strength and type of break for both 7 day tests and 28 day tests.
12. Perform additional tests of in-place concrete when test results indicate required strength level has not been achieved and/or other characteristics have not been attained in the structure, as directed by the Architect. The testing service may conduct tests to determine the adequacy of concrete by cored cylinders that comply with ASTM C42 or by such other methods as are directed by the Architect. Contractor shall pay for such tests and any additional testing that may be required when concrete is verified to be unacceptable.
13. Employ, at the Contractor's expense, a testing laboratory to perform Flatness/Levelness Testing. Comply with ASTM E-1155-96, but provide a minimum of one line of sampling in two perpendicular directions through each structural bay.
 - a. Perform testing using a "Dipstick Profiler" within 72 hours of concrete placement.
 - b. Supplement Dipstick testing with use of 10 foot certified straight edge placed randomly on the floor. Floor surface shall not exceed 3/8" below edge of straight edge anywhere along its surface when ends are placed on adjacent high spots.

E. To facilitate testing and inspection, the Contractor shall:

1. Furnish labor to assist testing agency in obtaining and handling samples at the job site.

2. Advise testing agency in advance of operations to allow for the assignment of testing personnel and testing.
3. Provide and maintain for the use of the testing agency adequate facilities for proper curing of concrete test specimens on the project site in accordance with ASTM C 31.

PART II PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: Unless otherwise specified or shown on the drawings, construct formwork for exposed concrete surfaces with plywood, metal, metal framed plywood, or other panel type materials acceptable to the Architect in order to provide exposed surfaces that are continuous, straight, and smooth. To minimize the number of joints and to conform to the joint system shown on the drawings, furnish panels in the largest practicable sizes. Provide form material that is thick enough to withstand pressure of newly placed concrete without bowing or deflection.
- B. Forms for Unexposed Finish Concrete: For surfaces that will be unexposed in the finished structure, form concrete with plywood, lumber, metal, or other material acceptable to the Architect. If lumber is used, it shall be dressed on at least two edges and one side for tight fit.
- C. Automatic machine placement shall be used for curb placement. Submit revised mix design and laboratory test results that meet or exceed requirements for outdoor concrete. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete.

2.02 REINFORCING MATERIALS:

- A. Reinforcing Bar: ASTM A615, Grade 60.
- B. Welded Wire Fabric: ASTM A185, welded steel wire fabric.
- C. Supports for Reinforcement: Provide supports for reinforcement, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Unless otherwise indicated on the drawings, use wire type bar supports complying with CRSI recommendations. Concrete brick, wood, construction debris and other organic material will not be acceptable. Comply with the following:
 1. For slabs on grade, where wetted base material will not support chair legs, use supports with sand plates or horizontal runners.
 2. Use Mesh-Ups plastic wire mesh supports as manufactured by Lotel, Baton Rouge, 800-535-8375 or equal product as manufactured by Grip Rite/PROLOK or Dayton Superior/Aztec.
 3. For concrete surfaces exposed to view, where leg supports are in contact with forms, provide supports with legs that are hot dip galvanized or protected by either plastic or stainless steel.

2.03 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C150, Type I. Use only one brand of cement throughout the project, unless otherwise acceptable to the Architect.
- B. Normal Weight Aggregates: ASTM C33, or local aggregates that do not comply with ASTM C33, but that have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.

- C. Fine aggregate: Clean, sharp, natural sand or crushed gravel when used for vehicular wearing surfaces. Manufactured sand may be used elsewhere provided the percentage passing a No. 200 sieve is less than 3%.
- D. Coarse Aggregate: Crushed stone conforming to ASTM C 33 standard specification for concrete aggregates that is clean, uncoated, and processed from natural rock or stone and that contains no clay, mud, loam, or foreign matter.
- E. Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.
- F. Vapor Barrier: The vapor barrier shall be placed over prepared base material where indicated below slabs on grade. Vapor Barrier shall conform to ASTM E 1745, Class A. The membrane shall have a water vapor permeance rate on no greater than 0.01 perms when tested in accordance with ASTM E 1745 Section 7.1. Membrane shall have minimum tensile strength of 58 lbf and a Resistance to Puncture of 2600 grams in accordance with ASTM test standards. Vapor barrier shall be no less than **20 mil** thick in accordance with ACI 302.1R.
 - 1. Available Product: Subject to compliance with requirements, products that are pre-approved for incorporation into Work are Stego Wrap (20 mil) Vapor Barrier by Stego Industries LLC, Perminator EVOH by W. R. Meadows or Dura-Skrim by Raven Industries.
- G. Water: clean, fresh, drinkable.
- H. Admixtures:
 - 1. Water Reducing Admixture: Conforming to ASTM C494, Type A, Eucon WR-75, WR-91 or MR by the Euclid Chemical Company, Pozzolith 322N or Polyheed 997 by Master Builders, or Plastocrete 161 by Sika Chemical Corporation.
 - 2. Water Reducing, Retarding Admixture: Conforming to ASTM C494, Type D, Eucon Retarder-75 by the Euclid Chemical Co., Pozzolith 100XR by Master Builders, Plastiment by Sika Corp. or Daratard - 17 by WR Grace and Co.
 - 3. High Range Water Reducing Admixture: Conforming to ASTM C494, Type F or G, (Superplasticizer): Eucon 37, 1037 or Plastol 5000 by the Euclid Chemical Co. or Rheobuild 1000 or 716 by Master Builders or Sikament 686 by Sika Corp.
 - 4. Non-chloride Accelerator: Accelguard 80 by the Euclid Chemical Co. or Darex Set Accelerator by W.R. Grace or SikaSet NC by Sika Corp.
 - 5. Air Entraining Admixture: ASTM C260.
 - 6. Pozzolanic Admixtures: ASTM C618.
 - 7. Prohibited Admixtures: Calcium Chloride or admixtures containing more than 0.05% Chloride Ions are not permitted. Admixtures indicated as prohibited on drawings shall not be used whether or not they appear in the list above.
- I. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C618, Type F: Ignition loss shall not exceed three (3) percent. Only one source of fly ash shall be used.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
 - 3. Fly ash shall be used at a maximum percentage rate of 25% of Portland Cement by weight and blast furnace slag at a maximum percentage rate of 40% of Portland Cement by weight. Do not use fly ash for concrete to receive hardeners. The exact amount selected shall be based on a successful test placement.

2.04 RELATED MATERIALS:

- A. Mineral Aggregate Base: Open graded stone conforming to ASTM No. 57

Sieve Size , Grading D	Total Percent by Weight, Passing Sieves
1-1/2 in. (37.5 mm)	100
1 in. (25 mm)	95-100
1/2 in. (12.5 mm)	50-80
No. 4 (4.75 mm)	0-10
No. 8 (2.36 mm)	0-5

- B. Waterstops shall be Vinylex RB6316H preformed PVC ribbed waterstop by Vinylex Corporation, Knoxville, Tennessee or equal by Greenstreak or Paul Murphy Plastics Co.
- C. Joint Filler: Provide preformed joint filler at slab expansion joints, joints between floor slabs and walls and other isolation joints. Provide one of the following:
1. Precompressed, impregnated open cell foam.
 2. Asphalt saturated fiberboard complying with ASTM D 1751
 3. Granulated cork between saturated felt or glass fiber felt complying with ASTM D1752 Type H.
- D. Curing Compounds:
1. Curing and Sealing Compound (VOC Compliant, 700 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.30 Kg/m² when applied at 300 sf/gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products: Super Rez Seal by The Euclid Chemical Co. or Seal-Cure 309-25/30 by W.R. Meadows or Lumiseal Plus by L&M Construction Chemicals Inc.
- Or
2. Clear Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m² when applied at 300 sf/gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products: Super Diamond Clear VOX or Super Rez Seal VOX by The Euclid Chemical Co. or Vocomp-30 by W.R. Meadows or Lumiseal WB Plus by L&M Construction Chemicals Inc.
 3. Curing Compound (Strippable for use on slabs to receive direct applied finishes): The curing compound shall conform to ASTM C309. Provide Kurez DR VOX by The Euclid Chemical Co. or 1100 Clear Series by W. R. Meadows or L&M Cure R by L&M Construction Chemicals Inc.
 4. For concrete to receive a special concrete finish (i.e., staining, polishing, etc.), curing compounds called for in those specification sections, if any, shall take precedence over curing compounds specified herein solely for those areas to receive such finish.
- E. Bonding Compound: Provide polyvinyl acetate, rewettable type compound. Do not use in areas subject to moisture. Euco Weld by Euclid Chemical Co. or Weldcrete by Larsen or LiquidWeld by Sika Corp.
- F. Epoxy Adhesive: Where called for, compound shall be a 2 component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces.
- G. Non-shrink Grout: The grout shall conform to CRD-C621-80, "Corps of Engineers Specification for Non-shrink Grout". Euco NS by the Euclid Chemical Co. or Masterflow 713 by Master Builders or SikaGrout 212 by Sika Corp.

- H. High Flow Grout: Where high fluidity and/or increased placing time is required, use high flow grout. The factory pre-mixed grout shall conform to ASTM C1107, "Standard Specification for Packages Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 18" x 36" base plate. Provide Hi-Flow Grout by The Euclid Chemical Co. or SikaGrout 328 by Sika Corp or MasterFlow 928 by Master Builders.
- I. Integral Color Dye for Exterior Application: Colored concrete system by L.M. Scofield Company or equal approved prior to bidding, having the following characteristics:
1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
 2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.
 3. Curing compound shall comply with ASTM C309.
 4. Color: To be selected by Architect from manufacturer's standard chart.
- J. One Part Repair Topping: Latex and microsilica modified cementitious mortar designed for use as a floor or deck topping at thicknesses of 1/16" to 3/8". Product shall be Thin-Top Supreme by Euclid Chemical Co. or SikaTop 122 Plus by Sika Corp. for thicknesses up to 2". Product shall be Concrete-Top Supreme by Euclid Chemical Co. or SikaTop 121 Plus by Sika Corp.
- K. Underlayment Compound: Free-flowing, self-leveling, pumpable cementitious base compound, "Super Flo-Top" by The Euclid Chemical Co. or SikaLevel 315 by Sika Corp or Level Set 300 by TEC. The compound shall exhibit the following properties:
- | | |
|----------------------------------|----------------------|
| Compressive Strength (ASTM C109) | - 4400 PSI @ 7 days |
| | - 5000 PSI @ 28 days |
| Bond Strength (ASTM C1042) | - 700 PSI @ 7 days |
| | - 1000 PSI @ 28 days |

2.05 MISCELLANEOUS MATERIALS:

- A. Fill concrete spandrel blocks with concrete and reinforce with two (2) No. 4 bars to form cap beams at top of all masonry walls unless noted otherwise.
- B. Fill steel pan stair risers and landings with non-slip concrete, poured in place and reinforced with 2" diamond mesh lath or fiber mesh. The fill shall consist by volume of 1 part Portland cement, 1-1/2 parts sand and 3 parts pea gravel. Fill shall have a smooth steel trowel finish.
- C. Provide 2'-6" x 2'-6" corner bars of same size and number as footing reinforcing in all foundation corners unless noted otherwise.
- D. Concrete slabs on grade at dumpster pads and equipment pads shall be 6 inch concrete reinforced with WWF 6 x 6 – W2.9 x W2.9 over 4 inches of crushed stone unless noted otherwise on the drawings.

2.06 MIX DESIGN:

- A. Preparation
1. Prepare design mixes for each type and strength of concrete in accordance with ACI 318, "Building Code Requirements for Structural Concrete," Section 5.3 and with applicable provisions of ASTM C94. Submit written reports of each proposed mix for each class of concrete on the Mix Design Submittal Form included at the end of this specification at least 15 days before the start of work.
 2. Provide special mix design for use with automatic machine placement of curbs.

3. The design mix shall provide normal weight concrete with 28 day compressive strength as indicated on the drawings or as shown below if not otherwise indicated.

B. Admixtures

1. All concrete shall contain the specified water reducing admixture or high-range water-reducing admixture. All concrete slabs placed at air temperatures below 50° F shall contain the specified non-chloride accelerator. All concrete required to be air entrained shall contain an approved air entraining mixture. All pumped concrete and concrete with a W/cm of less than 0.50 shall contain the specified high-range water-reducing admixture.
 - a. Use an air entraining admixture in all concrete structures and slabs exposed to freezing and thawing or subjected to hydrostatic pressure:

2.5% to 5.5% for maximum 2 inches aggregate
4.5% to 7.5% for maximum 3/4 inch aggregate
5.5% to 8.5% for maximum 1/2 inch aggregate
 - b. All trowel finished interior slabs: Maximum air content of 3% (do not add air entraining admixture).
2. Water/Cement Ratio:
 - a. Concrete exposed to freezing and thawing: 0.50
 - b. Concrete subject to deicers and/or required to be watertight: 0.45
 - c. Concrete subject to brackish water or salt spray: 0.40
 - d. Interior trowel finished slabs subject to vehicular traffic: 0.53
 - e. All other concrete: 0.58
3. Use the amounts of admixtures recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

2.07 SELECTION OF PROPORTIONS:

A. General:

Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water, admixtures, and as specified, Air Entraining Admixture. Proportions of ingredients shall produce concrete that will work readily into corners and angles of forms, bond to reinforcement, without segregation or excessive bleed water forming on the surface. Proportions of materials shall be in accordance with ACI 211.1, "Recommended Practice for Selecting Proportions for Normal, Heavy and Mass Weight Concrete."

1. Proportions of ingredients shall be selected by past field experience or, in lieu of past performance, laboratory trial mixes to produce placeability, durability, specified strength and properties specified.

B. Required Average Strength Above Specified Strength:

Determinations of required average strength (f'_c) shall be in accordance with ACI 318, "Building Code Requirements for Reinforced Concrete," and evaluations of compressive strength results of field concrete shall be in accordance with ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."

1. Past Field Experience - Proportions shall be established on the actual field experience of the ready-mix producer with the materials proposed to be employed. Standard deviations shall be determined by 30 consecutive tests (or two groups of tests totaling 30 or more).

- a. Average strength (f 'c) shall exceed specified strength (f 'c) by at least:

400 psi (2.8 MPa)	-	standard deviation is less than 300
550 psi (3.8 MPa)	-	standard deviation is 300 to 400
700 psi (4.8 MPa)	-	standard deviation is 400 to 500
900 psi (6.2 MPa)	-	standard deviation is 500 to 600
1200 psi (8.3 MPa)	-	standard deviation is above 600 or unknown

2. Trial Mixes - When the ready-mix producer does not have a record of past performance, the combination of materials and the proportions selected shall be selected from trial mixes having proportions and consistencies suitable for the work based on ACI 211.1-91, using at least three different water-cement ratios which will produce a range of strengths encompassing those required.

- a. Average strength (f 'c) required shall be:

Specified compressive strength	--	Required average compressive strength
Less than 3000 (f 'c psi)	--	f 'c + 1000 (f 'c psi)
3000 to 5000 (f 'c psi)	--	f 'c + 1200 (f 'c psi)
Over 5000 (f 'c psi)	--	f 'c + 1400 (f 'c psi)

2.08 CONCRETE QUALITIES REQUIRED:

A. Specified Compressive Strength:

Specified Compressive (f 'c) Strength @ 28 days, unless noted higher on the drawings, shall be:

3000 psi (21 MPa) – Interior floor slabs (< 6" thick) with applied finishes and footings.

4000 psi (28 MPa) – Interior floor slabs (> or equal to 6" thick)

4000 psi (28 MPa) – Walks, curbs, columns, beams and other concrete exposed to the weather.

B. Slump:

1. Consolidation by vibration: 3 in. (76 mm) not to exceed 4 in. (102 mm).
2. Consolidation by other methods: 4 in. (102 mm) not to exceed 5 in. (127 mm).
3. Placement and consolidation by automatic machine: Slump as required by mix design.
 - a. Any concrete containing high-range water-reducing admixture (superplasticizer) shall have a maximum slump of 9" unless otherwise approved by the Architect. The concrete shall arrive at job site at a slump of 2" to 3", (3" to 4" for concrete receiving a "shake-on" hardener or lightweight concrete), be verified, then high-range water-reducing admixture added to increase slump to approved level. All other concrete shall have a maximum slump of 4."
 - b. Slump shall be determined by ASTM C 143-78, "Standard Test Method for Slump of Portland Cement Concrete."

- C. "Quick Dry" Concrete: Maximum W/cm – 0.40, superplasticized, 3% maximum air content. The floor finish shall be as required by the manufacturer of the specified floor coating or covering.

- D. Aggregate Size: Maximum size of coarse aggregate shall not exceed:

1. One-fifth narrowest dimension between forms.
2. Three-fourths minimum clear spacing between reinforcing bars.
3. One-third the thickness of slabs.
4. Use 1½" top size in all trowel finished interior slabs-on-grade subject to vehicular traffic.

2.09 CONCRETE CLEANERS:

- A. Citrus based industrial degreaser and detergent. Acceptable products include:
 - 1. AC-4450 ORANGE NATURAL 20 CONCENTRATE as distributed by Interstate Products Inc. 800-474-7294
 - 2. Commercial Strength Contractor's Solvent as manufactured by Orange-Sol Industrial Products Inc. 800-279-8822
 - 3. De-Solv-It Heavy Duty 24 as manufactured by Orange-Sol Industrial Products Inc. 800-279-8822

PART III EXECUTION

3.01 PRE-CONCRETE CONFERENCE:

- A. At least 35 days prior to start of the concrete construction schedule, the contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures necessary to achieve the required concrete quality. Contractor shall send a pre-concrete conference agenda to all attendees 20 days prior to the scheduled date of the conference.

3.02 PREPARATION FOR SLABS ON GRADE:

- A. Subgrade: Before any base material is installed, compact the subgrade of the area to be paved to 100% of optimum density as determined by ASTM D698 (Standard Proctor).
- B. Base: Install a mineral aggregate base of the type specified above in accordance with Section 303 of the TDOT specifications.
- C. The base must not depress more than 1/2" under a fully loaded ready-mix concrete truck.

3.03 FORMWORK:

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.
- B. Use metal form ties that are factory made, adjustable in length, designed to prevent form deflection, and either removable or snap-off and that will prevent the concrete surface's being spalled when the ties are removed. If snap-off ties are used, the portion remaining within the concrete after removal must be at least 1-1/2 inches inside the concrete unless the drawings indicate otherwise.
- C. Provide openings in concrete formwork to accommodate the work of other trades. Determine the size and location of openings, recesses, and chases from the trades providing such work. Accurately place and securely support items built into forms.
- D. Clean thoroughly forms and adjacent surfaces that are to receive concrete. Remove chips, wood, sawdust, dirt, and any other debris just before the concrete is placed. After concrete placement, retighten forms if necessary to eliminate mortar leaks.

3.04 PLACING VAPOR BARRIER:

- A. Install vapor barrier in accordance with ASTM E1643.
- B. Arrange layout of vapor barrier to minimize seams and penetrations.
- C. Unroll vapor barrier over compacted aggregate base.
- D. Overlap all seams a minimum of six inches and seal with tape.

- E. All penetrations must be sealed using a combination of seam tape and mastic in accordance with manufacturer's latest printed instructions.
- F. Turn vapor barrier up at edge of slab to masonry wall juncture to provide bond break.

3.05 PLACING REINFORCEMENT:

- A. For details and methods of placing reinforcement and supports, comply with the specified codes and standards, the recommended practice of the CRSI as outlined in "Placing Reinforcing Bars," and these specifications.

3.06 INSTALLATION OF WATERSTOPS:

- A. Provide continuous waterstops and install waterstops in concrete joints where indicated.
- B. Carry waterstops in walls into lower slabs and join to waterstops in slabs with appropriate fittings.
- C. In water bearing structures, provide waterstops in all joints, whether or not indicated on drawings.
- D. Secure waterstops accurately to position and line as indicated on the drawings using factory installed hog rings or factory pre-punched holes in the outermost rib with tie wire. Do not drive nails, screws, or other fasteners through the waterstop at any time at any location.
- E. Secure at intervals of not more than 15 inches to prevent movement during the pour of concrete.
- F. Terminate waterstops 3 inches from the top of finished surfaces of walls and slabs, unless otherwise specified on the drawings.

3.07 CONCRETE PLACEMENT:

- A. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast in.
- B. Use mechanical vibrating equipment, including a laser screed, supplemented by hand spading, rodding, or tamping to consolidate placed concrete. The equipment and procedures used to consolidate the concrete shall comply with the recommended practices of ACI 309 and suit both the type of concrete and project conditions.
- C. Until the placing of a panel or section is completed, deposit and consolidate concrete slabs in a continuous operation within construction joints.
- D. Consolidate concrete during placing operations so that it is thoroughly worked around reinforcement and other embedded items and into corners.
- E. Bring slab surfaces to the correct level with a straightedge and strike off. Use appropriate bull floats or straightedges to smooth the surface, leaving it free from humps and hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces before starting finishing operations.
- F. Maintain reinforcement in the proper position during placement operations.
- G. Cold Weather Placement: Comply with ACI 306 and the requirements therein specified to protect concrete work from physical damage or reduced strength due to frost, freezing, or low temperatures.
- H. Hot Weather Placement: When the weather is hot enough to impair the concrete's quality and strength, place the concrete as specified herein and in ACI 305.

3.08 JOINTS:

- A. Locate and install construction joints (which are not shown on the drawings) as approved by the Architect so that the strength and appearance of the structure will not be impaired.
- B. Provide keyways at least 1-1/2 inches deep in construction joints that are in walls and slabs or between walls and footings. Bulkheads designed for this purpose may be used if accepted by the Architect. Construction joints, in slabs subjected to vehicular traffic, shall have round, square or diamond dowels as indicated on the drawings.
- C. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints of structural members.
- D. Construct isolation joints in slabs on the ground wherever there is contact between slabs on the ground and vertical surfaces and wherever else indicated on the Drawings.
- E. Contraction (control) joints in slabs on ground as shown on the Drawings shall have a maximum spacing of 30 times slab thickness (up to a maximum of fifteen (15) feet) each way if not shown otherwise.
- F. Saw-Cut Control Joints:
 - 1. Primary Method: Soff-Cut System method, by Soff-Cut International, Corona, CA, 800-776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 2 hours after final finish at each saw cut location. Use 1/8 inch thick blade, cutting 1-1/4 inch into slab.
 - 2. Optional Method (Where Equipment is Not Available for Primary Method): Properly time cutting with the set of the concrete. Saw-cut control joints within 12 hours after finishing. Start cutting as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/4 inch thick blade, cutting 1/4 slab depth.

3.09 FINISH OF FORMED SURFACES:

- A. Finishes to be in accordance with ACI 301.
- B. Trowel Finish: Apply a trowel finish to all interior slab surfaces unless otherwise noted on drawings. Concrete shall be placed, consolidated, struck-off and leveled to proper elevation using a laser screed, or vibratory screed. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots with highway straightedge. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Surface shall achieve an F(F) 20 – F(L) 17 tolerance. Surface shall then be troweled, at least twice, to a smooth dense finish, free of trowel marks, uniform in texture and appearance, and achieve a tolerance of F(F) 25 and F(L) 20 minimum overall composite and F(F) 17 and F(L) 15 minimum at any individual section measured according to ASTM E 1155. For floors to receive an applied floor covering, grind smooth any surface defects that could telegraph through applied floor covering or repair as necessary with specified repair compound or underlayment to achieve specified tolerance. For finishes in which the concrete surface is exposed to view, grinding or reparations involving compounds or underlayments are not acceptable and shall not be used to achieve specified floor tolerances.
- C. Non-Oxidizing Metallic Floor Hardener: All slabs, in areas subject to vehicular traffic including all loading dock areas and any other areas noted on drawings, shall receive an application of non-oxidizing, metallic floor hardener applied at a rate of 1.5 lbs/ft². Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of non-oxidizing metallic floor hardener over concrete surface, by mechanical spreader, and embed by means of power floating. Hardener shall be floated in and second application made. Surface shall be floated again to

properly bond hardener to base concrete slab. Surface shall then be troweled, at least twice, to a smooth dense finish.

- D. Mineral Aggregate Hardener: All slabs, in areas noted on drawings, shall receive an application of mineral aggregate hardener applied at a rate of 1.2 lbs/ft². Hardener shall be applied in two applications by mechanical spreader. First shake shall comprise 2/3 of specified amount of hardener. This application shall be made after initial floating operation unless climatic conditions dictate earlier application. Hardener shall be floated in and second application made. Surface shall be floated again to properly bond hardener to base concrete slab. Surface shall then be troweled, at least twice, to a smooth, dense finish.
- E. Non-slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps and elsewhere as indicated by the drawings or schedules. Texture shall be as approved by Architect from sample panels.
- F. Liquid Densifier/Sealer Finish: Apply this compound on exposed interior floors subjected to vehicular abrasion and shake on hardener slabs as indicated on the drawings. Application shall be made in strict accordance with directions of the manufacturer and just prior to completion of construction. Spray, squeegee or roll on liquid densifier to clean, dry concrete surface. Liquid should be scrubbed into surface with mechanical scrubber. Keep the surface wet with the densifier during the application process. When product thickens, but not more than 60 minutes after initial application, surface shall be squeegeed or vacuumed to remove all excess liquid
- G. Sealer/Dustproofer Finish: Apply a second coat of the specified curing and sealing compound to interior concrete floors where shown on the drawings or in schedules to be sealed concrete. The compound shall be applied in strict accordance with the directions of the manufacturers and just prior to completion of construction.

3.10 CURING:

- A. After placing and finishing the concrete, start initial curing as soon as free water has disappeared from concrete surface. Keep continuously moist for not less than 7 days and above 50° F. When high early strength concrete is used, the temperature requirement may be reduced to three days.
- B. Begin final curing immediately after initial curing and before the concrete has dried. Continue final curing in accordance with ACI 301. Avoid rapid drying at the end of the final curing period.
- C. All exposed interior slabs, not receiving a liquid densifier, and troweled slabs receiving mastic applied adhesives or "shake-on" hardeners shall be cured with the specified curing and sealing compound. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound. Maximum coverage shall be 400 ft²/gallon on steel troweled surfaces and 300 ft²/gallon on floated or broomed surfaces for the curing/sealing compound.
- D. Curing Compound (Strippable): Use the specified strippable curing compound on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials. Apply in accordance with manufacturer's instructions.

3.11 MISCELLANEOUS CONCRETE ITEMS:

- A. Filling In: Unless the drawings show otherwise or the Architect directs, fill in holes and openings left in concrete structures for the work of other trades once that work is in place. Mix, place, and cure concrete as specified herein to blend with in-place construction. Provide other miscellaneous concrete filling shown on the drawings or necessary to complete the work.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on the drawings. Set anchor bolts for machines and equipment to template at correct

elevations, complying with the certified diagrams or templates of the manufacturer furnishing the machines and equipment.

- C. Nonshrink Grout: Grout base plates and foundations as indicated using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.
 - 1. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than 10 square feet.

3.12 EVALUATION AND ACCEPTANCE:

- A. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- B. **No cracks which affect structural integrity will be accepted.** Affected areas to be removed and replaced. Submit repair plan to structural engineer for approval before beginning repairs
- C. Cracks which do not affect structural integrity:
 - 1. Cracks consistently greater than 1/4" in width will not be accepted, remove and replace section to nearest existing joint.
 - 2. Cracks showing vertical separation of plane will not be accepted remove and replace section to nearest existing joint.
 - 3. Cracks less than 1/4" in width, occurring in appearance sensitive areas (i.e. front entry, front sidewalk, etc.), may require replacement. Final decision resides with the Owner.
 - 4. Cracks less than a 1/4" in width in non-appearance sensitive areas will be filled with Bonsal vinyl concrete repair compound, or approved equal, following manufacturer's recommended application procedures.

3.13 WALKS AND CURBS:

- A. Walks and sidewalks shall be not less than 4" thick, placed over a 4" layer of porous fill as specified, and marked off with surface joints at 6'-0" o.c. as shown. Install expansion joints between walks and building, at changes in walk direction, at 30'-0" o.c., and elsewhere as shown. Expansion joints shall be formed with 1/2" thick preformed filler.
- B. Curbs shall be constructed to size and profile shown, placed over binder course of paving. Provide expansion joints at 50 feet on center maximum.
- C. All edges, joints and margins shall be straight and true and rounded with jointing and edging tools.
- D. Walks shall be sloped 1/4" per foot.

3.14 REPAIR OF DEFECTIVE AREAS

- A. With prior approval of method and procedure by the Engineer, all repairs of defective areas shall conform to ACI 301, Section 5.3.7, except that the specified bonding compound must be used.
- B. Leveling of floors for subsequent finishes shall be achieved by use of the specified underlayment material.
- C. All exposed floors shall be leveled, where required, with the specified self-leveling repair topping.
- D. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.15 CLEANING AND PROTECTION:

- A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.
- C. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris. Use power washer set to low pressure (800 psi maximum) with orange cleaner/degreaser to clean all exposed exterior concrete.
- D. Wash and rinse surfaces according to concrete finish applicator's recommendations and cleaning solutions written instructions. Protect other Work from staining or damage due to cleaning operations.
- E. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

End of Section

CONCRETE MIX DESIGN SUBMITTAL FORM

Project: _____
City: _____
General Contractor: _____
Concrete Contractor: _____
Concrete Strength (Class): _____
Use (describe): _____

Design Mix Information

Based on Standard Deviation Analysis ☐ Please check one
Trial Mix Test Data ☐

Design Characteristics:

Density pcf
Strength psi (28 day)
Air % specified

*If trial mixes are used the Mix Design is proportioned to achieve $f'_{cr} = f'_c + 1200$ psi
(1400 psi for strength higher than 5000 psi at 28 days)*

<u>MATERIALS</u>	Type/ Source	Specific Gravity	Weight/lb.	Absolute Vol. cu.ft.
Cement				
Flyash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

* Water/Cement Ratio (lbs. water/lbs. cement) = _____ %

<u>ADMIXTURES</u>	Manufacturer	Dosage oz/cwt
Water Reducer		
Air Entraining Agent		
High Range Water Reducer		
Non-Corrosive Accelerator		
Other		

Slump before HRWR _____ inches
Slump after HRWR _____ inches

Standard Deviation Analysis (from experience records):

# of Test Cylinders Evaluated:	
Standard Deviation:	

$$f'_{cr} = f'_c + 1.34s \text{ or } f'_{cr} = f'_c + 2.33s - 500$$

(Refer to ACI 301 for increased deviation factor when less than 30 tests are available)

LABORATORY TEST DATA

Compressive Strength

Age (days)	Mix # 1	Mix #2	Mix #3
7	psi	psi	psi
7	psi	psi	psi
28	psi	psi	psi
28	psi	psi	psi
28 average	psi	psi	psi

REQUIRED ATTACHMENTS:

Coarse Aggregate Gradation Report

Fine Aggregate Gradation Report

Concrete Compressive Strength Data or Trial Mixture Test Data

Admixture Compatibility certification letter

Please Check

Submitted by:

Name: _____

Address: _____

Phone #: _____

Main Plant Location: _____

Miles from Project: _____

Secondary Plant Location: _____

Miles from Project: _____

Date: _____

SECTION 03 33 00 – IMPRINTED, COLORED, CONCRETE WORK

PART I GENERAL

1.01 SCOPE:

- A. The extent of colored stamped concrete work is to be at the covered patio spaces located outside the Bistro Cafeteria.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 03 30 00 Concrete Work

1.03 DESCRIPTION –

- A. Bomanite/Bomacron Imprinted Concrete includes:

1. Materials: Forming materials, reinforcement, concrete, dry-shake color hardener, curing compound, release agent and sealer.
2. Special imprinting and texturing tools.
3. Concrete placement and finish.
4. Color hardener and release agent placement.
5. Pressure washing to remove excess release agent.
6. Curing compound application
7. Sealer application.

1.04 REFERENCES AND STANDARDS

- A. Imprinted Concrete:
Install in accordance with the standards and specifications of Bomanite Corporation or other approved supplier and the American Concrete Institute (ACI).
- B. The contractor for this work shall be an approved licensed contractor who has been trained and equipped by manufacturer of the imprinting and coloring materials being used:

1.05 DEFINITIONS

- A. COLORED, IMPRINTED CONCRETE: A cast-in-place concrete slab, having the surface colored and imprinted with a pattern. The work is performed on the job site by trained and experienced workmen.

1.06 RELATED WORK

- A. The following related work shall be completed by a manufacturer certified contractor except where noted.

- B. Preparation work, including, constructing formwork, placing and setting screeds, and furnishing and placement of reinforcement shall be done by a manufacturer approved, licensed contractor or other qualified contractor.
- C. Provide and place concrete.
- D. For all pedestrian and light traffic applications, provide and apply regular grade Bomanite Color Hardener. For heavy pedestrian and vehicular traffic, provide and apply heavy duty grade Bomanite Color Hardener.
- E. Provide and apply all Bomacron release agents. Release agent is a dry powdered, colored agent used to facilitate release of the imprinting tools from concrete surface, and to provide moderate color variations to the textured surface.
- F. Provide and apply Bomanite and/or Bomacron imprinting tools.
- G. Provide and apply curing compound.
- H. Provide and apply sealer.
- I. Outside edges of all imprinted slabs shall be left uncolored unless otherwise specified in the drawings.
- J. Provide and apply Bomanite Con-Shield to exterior slabs per manufacturer's recommendations. Con-Shield will prevent deterioration and spalling from deicing salts used in freeze/thaw conditions. Con-Shield will also increase the abrasion resistance of the finished slab.

1.07 QUALITY ASSURANCE

- A. The Imprinted concrete contractor shall provide a qualified foreman or supervisor who has a minimum of three years experience with imprinted and textured concrete, and who has successfully completed at least five imprinted concrete installations of high quality and similar in scope to that specified herein, and located within a 100 mile radius of the proposed project. Evidence that the contractor is qualified to complete the project in a workmanlike manner as specified herein shall be submitted to, and approved by, the architect/engineer.
- B. All imprinted concrete work shall comply with the current specifications and quality standards issued by Manufacturer.
- C. The imprinted concrete contractor shall provide a job site sample (referee sample) of 100 square feet minimum to be approved by the architect/engineer prior to the start of construction. Said sample shall be the standard for the balance of the work installed, and shall be protected against damage until final approval from the architect/engineer.

PART II PRODUCTS

2.01 APPROVED MANUFACTURER

- A. Bomanite Corporation
P.O. Box 599
Madera, California 93639-0599
Tel: (559) 673-2411
Fax: (559) 673-8246

Web site: www.bomanite.com

Other producers of equal products approved prior to bidding.

2.02. CONCRETE MIX DESIGN

- A. Concrete shall conform to the requirements of Section 03 30 00. The concrete shall have a minimum compressive strength of 3000 psi in non-freeze areas, 3500 psi in moderate freeze-thaw areas and 4000 psi in severe freeze-thaw areas. Portland cement no admixtures containing calcium chloride shall be permitted.

2.03 COLORING, IMPRINTING, CURING AND SEALING MATERIALS

- A. Bomanite Color Hardener: The concrete shall be colored with the Bomanite Color Hardener color (s) noted on the drawings. The grade of the hardener shall be: Regular Grade.
- B. Bomacron Release Agent: Bomacron Release Agent color(s) applied to all concrete surfaces to be imprinted and textured shall be as noted on the drawings.
- C. Pattern: The imprinting pattern to be used shall be noted on the drawings. All imprinting
- D. Curing: All imprinted concrete slabs shall be cured with manufacturer approved, clear curing compound or approved equal. Imprinted concrete slabs are not compatible with curing compounds, and do not typically require membrane or mechanical curing. Imprinted/textured concrete may be cured using nonstaining reinforced curing paper when necessary.
- E. Sealer: All imprinted slabs shall be sealed in accordance with the manufacturer's recommendations.

PART III EXECUTION

3.01 INSTALLATION PROCEDURES

- A. The area to receive imprinted concrete shall have the sub-grade prepared and compacted as required by local governing authority and conditions.
- B. The formwork shall be installed in accordance with the drawings. The slab thickness shall be consistent with that of ordinary concrete slabs under the same conditions.
- C. Provide reinforcement as specified.
- D. Control joints and/or expansion joints shall be provided in accordance with the drawings and the guidelines established by the American Concrete Institute. As with any concrete slab, imprinted concrete usually contains construction joints, control joints and expansion joints. The contractor shall advise and work with the architect/engineer to determine the best location for these joints to minimize the visibility of the joints and to minimize unsightly cracking.
- E. The concrete shall be placed and screeded to the finished grade and floated to a uniform surface using standard finishing techniques.
- F. Color Hardener shall be applied evenly to the surface of the fresh concrete by the dry-shake method using a minimum of 60 pounds per 100 square feet. It shall be applied in two or more shakes, floated after each shake and troweled only after the final floating.

- G. Release Agent shall be applied evenly to the troweled surface prior to imprinting.
- H. While the concrete is still in its plastic stage of set, the imprinting tools shall be applied to the surface.
- I. Approved curing method shall be applied in accordance with the manufacturer's recommendations immediately after completing the imprinting process. Reference paragraph 2.02.
- J. After the initial curing period (and grouting operation, if applicable), the surface of the slab shall be sealed.

End of Section

SECTION 03 35 10– POLISHED CONCRETE FINISHING:

PART 1 - GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment and supervision to provide and install polished concrete in areas indicated on the drawings.

1.02 REFERENCES:

- A. American Concrete Institute (ACI):
 - 1. ACI 302.1R Guide for Concrete Floor and Slab Construction
- B. ASTM International:
 - 1. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 2. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete.
 - 3. ASTM C779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
- C. Reunion Internationale des Laboratoires D'Essais et de Recherches sur les Matériaux et les Constructions (RILEM):
 - 1. Rilem Test Method 11.4 Standard Measurement of Reduction of Moisture Penetration Through Horizontal Concrete
- D. National Floor Safety Institute (NFSI):
 - 1. NFSI Test Method 101-A Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes.

1.03 PERFORMANCE REQUIREMENTS:

- A. Provide polished flooring that has been selected, manufactured and installed to achieve the following:
 - 1. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008 inch wear in 30 minutes.
 - 2. Reflectivity: Increase of 35% as determined by standard gloss meter.
 - 3. Waterproof Properties: Rilem Test Method 11.4, 70% or greater reduction in absorption.
 - 4. High Traction Rating: NFSI 101-A, non-slip properties.
- B. Design Requirements:
 - 1. Hardened Concrete Properties:
 - a. Minimum Concrete Compressive Strength: 3500 psi (24 MPa).
 - b. Normal Weight Concrete: No lightweight aggregate.
 - c. Non-air entrained.
 - 2. Placement Properties:
 - a. Natural concrete slump of 4 1/2 inches - 5 inches. Admixtures may be used.
 - b. Flatness Requirements:

- i. Overall FF 40.
 - ii. Local FF 20.
 - 3. Hard-Steel Troweled (3 passes) Concrete: No burn marks. Finish to ACI 302.1R, Class 5 floor.
- 1.04 ACTION SUBMITTALS:
- A. General: Submit listed action submittals in accordance with Division 01.
 - B. Shop Drawings: Indicate information on shop drawings as follows:
 - 1. Typical layout including dimensions and floor grinding schedule.
 - 2. Plan view of floor and joint pattern layout.
 - 3. Areas to receive colored surface treatment.
 - 4. Hardener, sealer, densifier in notes.
 - C. Product Data: Submit product data, including manufacturer's SPEC-DATA® product sheet, for specified products.
 - 1. Material Safety Data Sheets (MSDS).
 - 2. Preparation and concrete grinding procedures.
 - 3. Colored Concrete Surface, Dye Selection Guides.
- 1.05 INFORMATIONAL SUBMITTALS:
- A. Quality Assurance:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties as cited in 1.03 Performance Requirements.
 - 2. Certificates:
 - a. Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 - b. Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A.
 - c. Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.
 - 3. Manufacturer's Instructions: Manufacturer's installation instructions.
- 1.06 CLOSEOUT SUBMITTALS:
- A. Warranty: Submit warranty documents specified.
 - B. Operation and Maintenance Data: Submit operation and maintenance data for installed products.
 - 1. Include:
 - a. Manufacturer's instructions on maintenance renewal of applied treatments.
 - b. Protocols and product specifications for joint filing, crack repair and/or surface repair.
- 1.07 QUALITY ASSURANCE:
- A. Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 2. Installer trained and holding current certification for installation by manufacturer.
 3. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.
- B. Regulatory Requirements.
1. NFSI Test Method 101-A Phase Two Level High Traction Material.
 2. Applicable Building Codes
- C. Mock-Ups:
1. Mock-Up Size: 100 s.f. sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.
 2. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, color selection and shine.
 3. Allow adequate time for inspection of mock-up before proceeding with work.
 4. When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.08 PRE-INSTALLATION MEETING:

- A. Pre-installation meeting: To be attended by the Architect, General Contractor, Concrete Sub-Contractor, and Polished Concrete Sub-Contractor.
- B. Issue a proposed agenda to all parties requested to attend not less than 5 working days prior to the meeting. Include:
1. Environmental requirements
 2. Scheduling and phasing of work
 3. Coordinating with other work and personnel
 4. Protection of adjacent surfaces.
 5. Surface preparation
 6. Repair of defects and defective work prior to installation
 7. Cleaning
 8. Installation of polished floor finishes.
 9. Application of liquid hardener, densifier.
 10. Protection of finished surfaces after installation.
- C. Convene a minimum of two weeks before starting work of this section.

1.09 WARRANTY:

- A. Time Period: Warrant that the Polished Concrete Floor will maintain its luster and overall appearance with reasonable cleaning for (36) months from date of Final Acceptance.
- B. Repairs:
1. Repair unsatisfactory conditions promptly at no additional cost to the Owner.
 2. Emergency repairs may be made by the Owner without relieving the Contractor of his warranty obligations.
 3. Delays of more than 30 days for repair work will allow the Owner to proceed with such repairs at the Contractor's expense.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Ensure manufacturer has minimum 5 years experience in manufacturing components similar to or exceeding requirements of project.

2.02 PRODUCTS/SYSTEM

- A. Manufacturer: L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152-1140; Telephone: (800) 362-3331, (402) 453-6600; Fax: (402) 453-0244; website: www.LMCC.com or alternate manufacturer approved by Architect prior to bidding:

- B. Products/Systems:

- 1. Hardener, Sealer, Densifier: Proprietary, water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.
 - a. Basis of Design: L & M Construction Chemicals, Inc., FGS Hardener Plus.
- 2. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
 - a. Basis of Design: L & M Construction Chemicals, Inc., Joint Tite 750.
- 3. Oil Repellent Sealer: Ready to use, silane, siloxane and fluoropolymers blended water-based solution sealer, quick drying, low-odor, oil and water repellent, VOC-compliant and compatible with chemically hardened floors.
 - a. Basis of Design: L & M Construction Chemicals, Inc., Petrotex.
- 4. Concrete Dyes: Fast-drying dye, packaged in premeasured units ready for mixing with VOC exempt solvent; formulated for application to polished cementitious surfaces.
 - a. Basis of Design: L & M Construction Chemicals, Inc., Vivid Concrete Dyes.
 - b. Color: As selected by Architect.
- 5. Cleaning Solution: Mild liquid concrete cleaner and conditioner containing wetting and emulsifying agents; biodegradable, environmentally safe and certified High Traction by National Floor Safety Institute (NFSI).
 - a. Basis of Design: L & M Construction Chemicals, Inc., FGS Concrete Conditioner.
- 6. Finish: Standard Medium gloss (MG-2), 800 grit.

2.03 SOURCE QUALITY CONTROL

- A. Ensure concrete finishing components and materials are from single manufacturer.

PART III - EXECUTION

3.01 MANUFACTURERS INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions.
- B. Use installers certified by the manufacturer.

3.02 EXAMINATION

- A. Site Verification of Conditions:

1. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.
- B. Verify Concrete Slab Performance Requirements.
1. Verify concrete is cured to 3500 psi strength.
 2. Verify concrete surfaces received a hard steel-trowel finish (3 passes) during placement.

3.03 PREPARATION

- A. Ensure that manufacturer's requirements for environmental conditions have been satisfied prior to installation. Verify that concrete has cured under appropriate conditions for the required amount of time and that slab has been exposed to climate-controlled conditions for the required length of time prior to installation.
- B. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials.
- C. Examine surface to determine soundness of concrete for polishing.
- D. General Contractor to remove surface contamination.

3.04 INSTALLATION

- A. Floor Surface Polishing and Treatment:
1. Provide polished concrete floor treatment in entirety of slab indicated by drawings. Provide consistent finish in all contiguous areas.
 2. Apply floor finish prior to installation of fixtures and accessories.
 3. Diamond polish concrete floor surfaces with power disc machine recommended by floor finish manufacturer. Sequence with coarse to fine grit using dry method.
 - a. Comply with manufacturer's recommended polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.
 - b. Expose aggregate in concrete surface only as determined by approved mock-up.
 - c. All concrete surfaces shall be as uniform in appearance as possible.
 4. Dyed and Polished Concrete:
 - a. Locate demarcation line between dyed surfaces and other finishes.
 - b. Polish concrete to final finish level.
 - c. Apply diluted dyes to polished concrete surface.
 - d. Allow dye to dry.
 - e. Remove residue with dry buffer; reapply as necessary for desired result.
 5. Apply FGS Hardener Plus, Hardener, Densifier As Follows:
 - a. First coat at 250 ft²/gal (6.25 m²/L).
 - b. Second coat at 350 ft²/gal (8.75 m²/L).
 - c. Follow manufacturer's recommendations for drying time between successive coats.
 6. Remove defects and re-polish defective areas.

7. Finish edges of floor finish adjoining other materials in a clean and sharp manner.

3.05 ADJUSTMENTS

- A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.
- B. Fill joints flush to surface.

3.06 OWNER ORIENTATION

- A. Upon completion and acceptance, the Polished Concrete Contractor shall instruct the Owner's maintenance personnel in the operation, maintenance of the polished concrete floor system. Furnish copies of all user guides, available parts lists, specifications and information on trouble shooting.

3.07 CLEANUP

- A. Keep all areas of work clean, neat and orderly at all times.
- B. Clean up and remove all excess materials and debris from the entire work area prior to Final Acceptance.
- C. Sweep or vacuum floor thoroughly.
 1. Do not wash stained concrete until after time period recommended by manufacturer.
 2. Damp-mop floor to remove marks and soil.

3.08 PROTECTION

- A. Protect installed product from damage during construction.
- B. Protect with EZ Cover™ by McTech Corp., (866) 913-8363, www.ezform.net, or comparable product.

End of Section

SECTION 03 35 20 – PENETRATING CONCRETE STAIN:

PART 1 GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment and supervision to provide and install color hardened and chemically stained concrete in areas indicated on the drawings.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SYSTEM DESCRIPTION:

- A. Design and install a decorative stained concrete floor that represents the uniform multi-tone and color aspects shown on the drawings and specified herein with decorative concrete cuts and various concrete control joint patterns as described in Paragraph 2.04

1.04 PROJECT CONDITIONS:

- A. Allow concrete to cure for a minimum of 28 days prior to the installation of stain.
- B. Cure concrete by the use of curing paper or the use of wet curing methods. Do not apply membrane forming curing agents to concrete to be stained.
- C. Protect concrete surfaces from soiling prior to the installation of stains by covering.
- D. Close spaces to traffic during stain installation, and for a time period after installation recommended in writing by the manufacturer.

1.05 QUALITY ASSURANCE:

- A. Concrete stain contractor shall have completed ten (10) previous successful jobs of similar scope. The concrete stain contractor must have a minimum of 5 year experience of primarily staining and finishing concrete floors.
- B. Proposed Concrete Stain Contractors shall be licensed in accordance with the requirements of the State of Tennessee.
- C. Concrete Stain Contractor shall provide a foreman or supervisor who has experience with and knowledge of specialty architectural concrete finishes using the specified system
- D. Obtain each type, and color of stain, from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- E. The stain Contractor shall provide a jobsite sample (20 square feet minimum) to be approved by the Architect prior to the start of the construction. Said sample shall be the standard for the balance of the work installed and shall be protected against damage until final approval from the Architect. The cost for the construction and protection of the referenced sample shall be included as part of the Contractor's bid.
 - 1. Upon completion of the work, jobsite sample shall be demolished and removed from the project.

1.06 SUBMITTALS:

- A. Submit the following for review and acceptance prior to start of work:

1. Color samples and applications, decorative concrete cuts and product information on components to be used on the floor
2. Plans drawn to the 1/4" or 1/8" scale. Show location of seams and edges. Indicate location of columns, doorways, enclosing partitions, built-ins, and cutout locations.
3. Specifications.
4. Product data for each type of product specified.
5. Submit for review and approval, four (4) sets of Construction Documents.

1.07 PRE-INSTALLATION MEETING:

- A. Pre-installation meeting: To be attended by General Contractor, Concrete Subcontractor, Stained Concrete Subcontractor, Mechanical Subcontractor and Electrical Subcontractor and the Architect or Owner. Items of discussion shall include work schedules, work to be completed prior to installation of stained concrete, installation requirements, and protection of completed work. Coordinate with other contractors to enable work to proceed as rapidly and efficiently as possible.
- B. Issue a proposed agenda to all parties requested to attend not less than 5 working days prior to the meeting.
- C. Convene a minimum of two weeks before starting work of this section.

1.08 WARRANTY:

- A. Time Period: Warrant that the Stained Concrete Floor will maintain its color luster and overall appearance with reasonable cleaning for (36) months from date of Final Acceptance.
- B. Repairs:
 1. Repair unsatisfactory conditions promptly at no additional cost to the Owner.
 2. Emergency repairs may be made by the Owner without relieving the Contractor of his warranty obligations.
 3. Delays of more than 30 days for repair work will allow the Owner to proceed with such repairs at the Contractor's expense.

PART 2 PRODUCTS

2.01 GENERAL:

- A. All materials used in the system must be new and without flaws or defects of any type and be the best quality available. Materials shall have a minimum guarantee of two year against defects.

2.02 COLOR-HARDENED CONCRETE:

- A. All chemically stained surfaces shall be sealed with CEMENTONE® Clear Sealer or SCOFIELD™ Cureseal™ in accordance with Tech-Data Bulletin A-764 or B-204 (or COLORCURE® Concrete Sealer in the matching color in accordance with Tech-Data Bulletin A-634).
 1. All surfaces sealed with CEMENTONE® Clear Sealer, SCOFIELD™ Cureseal™, or COLORCURE® Concrete Sealer shall be coated with SCOFIELD™ Clearcoat™ in accordance with Tech-Data Bulletin B-304.

2. All joints in chemically stained flatwork shall be sealed using LITHOSEAL™ Traffickalk-3G™ in the blending color in accordance with Tech-Data Bulletin S-404-3G.
3. All stain products shall be manufactured by one of the following:
 - a. L. M. Scofield Company,
4155 Scofield Rd.
Douglasville, GA 30134
Phone: Toll Free (800) 800-9900 (770) 920-6000
Fax: (770) 920-6060
 - b. Q.C. Construction Products
8111 Jane St., Suite # 6
Concord, Ontario, L4K 4L7 Canada
Phone: (905) 760-0566
Fax: (905) 660-0258

2.03 MOISTURE TEST:

- A. Moisture vapor emission rate of concrete shall be determined through the use of calcium chloride testing in accordance with E-1907.
- B. Acceptable tests shall be similar and equal to calcium chloride vapor emission test kit supplied by Vaprecision Professional Vapor emission Testing Systems, P.O. Box 1396 , Costa Mesa, California 92628-1396, 800-449-6194, 714-754-6141, 714-754-6143 (fax), www.vaportest.com
 1. Density of tests shall be not less than 3 tests per 1000 sq. ft.

2.04 CONTROL JOINT PATTERNS:

- A. All control joints are to be between 1/8" and 1/4" wide. To avoid inconsistencies in staining process, Contractor is not to use any adhesive or polyurethane type product to protect the chalk cut lines. All borders are offset from the face of wall, casework or furring in all applicable spaces.

PART 3 EXECUTION

3.01 INSPECTION:

- A. The Stain Contractor shall inspect concrete to receive chemical stain prior to beginning work and shall bring any deficiencies, which would prevent him from producing an acceptable installation to the attention of the Architect; and the Contractor, He shall not proceed until the deficiencies are corrected. In any event, start of stain work shall be construed by the Architect as acceptance by the Contractor, of the substrate for proper installation. In no case shall correction of deficiencies in the floor substrate be cause for additional cost to the Owner.
- B. Verify that concrete slabs are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with penetration of stain. Determine adhesion and dryness characteristics by performing bond and moisture tests
- C. Verify existing conditions before starting work with a confirmation letter indicating the date of inspection and all relative aspects of work.

3.02 PREPARATION

- A. Layout must be approved prior to start.
- B. Review layout requirements with other affected work.

- C. The slab will need to be protected throughout the construction process. It is the general contractor's responsibility to assure that the protection of the slab meets the stain concrete contractors standards of protection.
- D. The use of automotive grade tape and paper coverings is required for color separation and protection of the surrounding finishes.

3.03 OWNER ORIENTATION

- A. Upon completion and acceptance, the Concrete Stain Contractor shall instruct the Owner's maintenance personnel in the operation, maintenance of the stained concrete floor system. Furnish copies of all guides, available parts lists, specifications and trouble shooting information.

3.04 CLEANUP

- A. Keep all areas of work clean, neat and orderly at all times.
- B. Clean up and remove all excess materials and debris from the entire work area prior to Final Acceptance.
- C. Sweep or vacuum floor thoroughly.
 - 1. Do not wash stained concrete until after time period recommended by stain and sealer manufacturer.
 - 2. Damp-mop floor to remove marks and soil.
- D. Protect flooring against marks, mars, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period.

End of Section

SECTION 05 12 00 – STRUCTURAL STEEL

1PART I GENERAL

1.01 SCOPE:

- A Furnish all material, labor, equipment, and supervision required to provide, fabricate, and install the following:
1. Structural steel framing members.
 2. Baseplates and anchor plates.
 3. Grouting under baseplates.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
- Section 05 50 00 “Shop Fabricated Metal” for steel lintels or shelf angles not attached to structural-steel frame; miscellaneous steel fabrications; and other metal items not defined as structural steel.
- Section 13 34 19 “Metal Building System” for structural steel and other steel fabrications defined as part of pre-engineered metal building package.

1.03 PERFORMANCE REQUIREMENTS:

- A Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.
1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction"
 - a. Construction: Type 1, rigid frame and 2, simple framing.

1.04 SUBMITTALS:

- A Submit under provisions of Section 01 33 00.
- B Shop Drawings:
1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments and fasteners.
 2. Connections.
 3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
- C Manufacturer's Mill Certificate: If requested by the Engineer, submit under provisions of Section 01 40 00 and Section 01 45 00 certifying that products meet or exceed specified requirements.
- D Mill Test Reports: If requested by the Engineer, submit under provisions of Section 01 40 00, Manufacturer's Certificates, indicating structural strength, destructive and nondestructive test analysis.
- E Welders' Certificates: If requested by the Engineer, submit under provisions of Section 01 40 00 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.

F Inspection test reports: Inspecting agency shall provide reports of tests conducted. Test results shall be reported to the Architect and Contractor in writing on the same day that the test is made. All tests reports indicating non-compliance should be faxed immediately to all parties on the test report distribution list.

1. Reports shall contain the project identification name and number, date of test, and location of test by column grid/ piece number as noted in the shop drawings.

1.05 QUALITY ASSURANCE:

A Fabricate structural steel members in accordance with AISC-Steel Construction Manual "Specification for Structural Steel Buildings".

B Provide qualifications for review and approval during the bidding process:

1. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE, **OR** as approved in writing after examination of Installer history by Structural Engineer.
2. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD" at time of bid **OR** as approved in writing after examination of Fabricator history by Structural Engineer.

C Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1. Comply with applicable provisions of the following specifications and documents:
2. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
3. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
4. AISC's "Specification for Structural Steel Buildings"
5. AISC's "Specification for the Design of Steel Hollow Structural Sections."
6. AISC's "Specification for Allowable Stress Design of Single-Angle Members".
7. AISC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.06 QUALIFICATIONS:

A Fabricator: Company specializing in performing the work of this section with minimum 3 years experience approved by the American Institute of Steel Construction Quality Certification Program, Category II or III.

1. A Fabricator not complying with Category II or III shall have an established, documented in-house quality control and testing program to assure accuracy and adequacy of fabrication procedures and completed work, or shall have fabrication procedures and fabricated steel tested and inspected by an independent testing agency as directed by the Structural Engineer. Tests and inspections are to be preformed by AWS Certified Welding Inspectors. **Fabricator shall submit documentation of quality control procedures to the Structural Engineer for review. The Structural Engineer shall be the sole judge of the adequacy of the proposed quality control program.** Submit copies of the inspection reports to the Structural Engineer. Payment of these tests and inspections will be by the fabricator. Tests and inspections shall include the following:
 - a. Examine mill tests reports and verify that material being used is the same as the mill test reports.
 - b. Review the fabricator's written welding procedures. Verify that the fabricator's welding procedures are being adhered to.

- c. Verify that welders are certified with current papers and that they demonstrate proper techniques.
 - d. Examine joint preparation for complete penetration joints. Ultrasonically test complete penetration joints.
 - e. Examine fillet welds for proper size, profile, throat, porosity and end returns.
 - f. Examine steel members for laminations. Spot check dimensions and hole sizes.
 - g. The purpose of this inspection is to enable the testing agency to verify that, in general, the steel is being fabricated in accordance with the proper specifications. A minimum of one trip should be scheduled in the early stages of fabrication.
- B Adhesive Anchors: Rawl/Powers Chem-Stud or equivalent manufactured by Hilti or Ramset/Red Head.
- C Erector: Company specializing in performing the work of this section with a minimum 3 years experience.
- D Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the state where the project is located.

1.07 REFERENCES:

- A The following are to be used as reference standards:
 - 1. Structural Steel angles, channels, and plate: ASTM A36; W-Shapes: A992.
 - 2. ASTM A108 - Steel Bars, Carbon, Cold Finished, Standard quality.
 - 3. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on iron and steel products.
 - 4. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
 - 5. ASTM A325 - High Strength Bolts for Structural Steel Joints.
 - 6. ASTM A500 - Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
 - 7. AWS A2.0 - Standard Welding symbols.
 - 8. AWS D1.1 - Structural Welding Code.
 - 9. AISC - Specification for the design, Fabrication and Erection of Structural Steel for Buildings.
 - 10. SSPC - Steel Structures Painting Council.

1.08 SPECIAL INSPECTIONS:

- A Special inspections shall be performed by a Special Inspector retained by the Owner.
- B Bolted Connections: Field-bolted connections will be tested and inspected according to AISC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 1. Manually torque test 10% of all bolted connections to verify correct tightness.
- C Welded Connections: Field welds will be visually inspected according to AWS D1.1. A certified AWS Weld Inspector shall visually inspect 100% of welded moment connections and 10% of all other welded connections.
 - 1. In addition to visual inspection, if requested by the Engineer, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.

- b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
- c. Ultrasonic Inspection: ASTM E 164.
- d. Radiographic Inspection: ASTM E 94.

D In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

- 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
- 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- 3. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

1.09 DELIVERY, STORAGE, AND HANDLING:

A Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

- 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
- 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 COORDINATION:

A Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

2PART II PRODUCTS

2.01 MATERIALS:

A Structural Steel Members: Channels, Angles, Plates: ASTM A36; W-Shapes: A992.

B Structural Tubing: ASTM A500, Grade B.

C Headed Studs: ASTM A108, Grade 1015, forged steel, headed, uncoated.

D Bolts, Nuts, and Washers: ASTM A325.

E Anchor Bolts: ASTM A307.

F Welding Materials: AWS D1.1; type required for materials being welded.

G Grout: No-shrink type, premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

H Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide or fabricator's standard.

I Protection for Structural Steel from Earth, Stone Backfill, or Concrete Backfill: 1/8 inch thick coat Hydrocide Mastic. Use one of the following in accordance with manufacturer's recommendations:

1. One coat Hydrocide 700 or two coats Hydrocide 700B by Degussa Building Systems.
2. One coat MasterSeal 614 or two coats MasterSeal 615 by BASF.
3. Additional alternate manufacturers must be approved by Engineer prior to Bidding and provide product equal to or exceeding specified requirements.

2.02 STRUCTURAL-STEEL MATERIALS

- A Structural Steel Members: Channels, Angles, Plates, M and S shapes: ASTM A36.
- B W-Shapes: ASTM A992, Grade 50
- C Plate and Bar: ASTM A 36/A 36M.
- D Corrosion-Resisting Structural Steel: ASTM A 588/A 588M, Grade 50 (345).
- E Structural Tubing: ASTM A500, Grade B.
- F Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847, structural tubing
- G Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 1. Weight Class: As indicated on the drawings.
 2. Finish: Black, except where indicated to be galvanized.
- H Medium-Strength Steel Castings: ASTM A 27/A 27M, Grade 65-35 (Grade 450-240), carbon steel.
- I High-Strength Steel Castings: ASTM A 148/A 148M, Grade 80-50 (Grade 550-345), carbon or alloy steel.
- J Headed Studs: ASTM A108, Grade 1015, forged steel, headed, uncoated.
- K Welding Materials: AWS D1.1; type required for materials being welded.
- L Grout: No-shrink type, premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- M Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide or fabricator's standard.
- N Protection for Structural Steel from Earth, Stone Backfill, or Concrete Backfill: 1/8 inch thick coat Hydrocide Mastic. Use one of the following in accordance with manufacturer's recommendations:
 1. One coat Hydrocide 700 or two coats Hydrocide 700B by Degussa Building Systems.
 2. One coat MasterSeal 614 or two coats MasterSeal 615 by BASF.
 3. Additional alternate manufacturers must be approved by Engineer prior to Bidding and provide product equal to or exceeding specified requirements.

2.03 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436
 1. Finish: Plain.
 2. Direct-Tension Indicators: If requested by Engineer: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.
 - a. Finish: Plain.

- B High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers, plain.
1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M,) Type 10.9, compressible-washer type, plain.
- C Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: If requested by Engineer: ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
1. Finish: Plain.
- D Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- E Unheaded Anchor Rods: ASTM F 1554, Grade 36.
1. Configuration: Straight.
 2. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 4. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
 5. Finish: Plain.
- F Headed Anchor Rods: ASTM F 1554, Grade 36.
1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 3. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
 4. Finish: Plain.
- G Threaded Rods: ASTM A 36/A 36M and ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6).
1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 2. Washers: ASTM F 436 ASTM F 436M or hardened ASTM A 36/A 36M carbon steel where noted.
 3. Finish: Plain.
- H Clevises/Turnbuckles: ASTM A 108, Grade 1035, cold-finished carbon steel.
- I Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.
- J Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

2.04 FINISH:

- A Prepare structural component surfaces in accordance with SSPC SP-2.
- B Shop prime structural steel members. Do not prime surfaces that will be field welded or high strength bolted, or in contact with concrete or masonry.

2.05 PRIMER

- A Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

- B Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer.

3PART III EXECUTION

3.01 FIELD MEASUREMENTS:

- A Verify that field measurements are as shown on shop drawings.

3.02 FABRICATION:

A Shop Fabrication and Assembly

1. Fabricate items of structural steel in accordance with AISC specifications for Type I construction and as indicated on the approved shop drawings. Provide camber in structural members as shown.
2. Properly mark and match-mark materials for field assembly and for identification as to the structure and site for which they are intended. Fabricate for a delivery sequence that will expedite erection and minimize field handling of materials.
3. Where finishing is required, complete the assembly (including welding of units) before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

- B Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings."

1. Camber structural-steel members where indicated.
2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

- C Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

- D Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

- E Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

- F Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

- G Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning."

- H Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

- I Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- J Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches (250 mm) o.c., unless otherwise indicated.
- K Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- L Connections
1. Provide bolts and washers of all types and sizes required for the completion of all field erection.
 2. High Strength Bolted Construction: Install high strength threaded fasteners in accordance with AISC Specifications for Structural Joints Using ASTM A325 Bolts, 3/4" diameter, minimum. Connections are to be considered bearing connections.
 3. Install by the turn of the nut method, or direct tension indicators or alternate design bolts.
 4. Welded Construction: Comply with the AWS Code for procedures, appearance, and quality of welds and for methods used in correcting welded work. Grind smooth any welds that will be exposed.
 5. Assemble and weld built-up sections by methods that produce true alignment of axes without warp.

3.03 SHOP CONNECTIONS

- A High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Types: Snug tightened, Pretensioned.
- B Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth if to remain exposed.
 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 4. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
- C Holes for Other Work

1. Provide holes required for securing other work to structural steel framing and the passage of other work through steel framing members as shown on the final shop drawings. Provide threaded nuts welded to framing and other specialty items as shown to receive other work.
2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

D Anchor Bolts

1. Provide anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
2. Provide templates and other devices necessary for presetting bolts and other anchors to accurate locations.

E Bases and Bearing Plates

1. Bases and bearing plates shall be shop welded to columns and members attached to concrete and masonry. Install slide bearing plates and protect against damage in accordance with the manufacturer's written directions.

F Splicing

1. Splice members only where indicated unless, with the Architect's approval, splices not indicated would result in lower costs due to reduced shipping costs. Submit structural calculations signed by a structural engineer licensed where the fabricator is located for all splices not indicated.

G Gas Cutting

1. Do not use gas cutting torches for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members, as acceptable to the Architect. Finish gas cut sections equal to a sheared appearance when gas cutting is permitted.

3.04 SHOP PRIMING

A Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning." Other methods if approved by Engineer.

C Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

Stripe paint corners, crevices, bolts, welds, and sharp edges.

1. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D Painting: Apply a 1-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).
- 3.05 EXAMINATION:
- A Verify that field conditions are acceptable and are ready to receive work.
- B Beginning of installation means erector accepts existing conditions.
- 3.06 ERECTION:
- A Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- B Field weld components indicated on Drawings and Shop Drawings.
- C Do not field cut or alter structural members without approval of Architect.
- D After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- E Grout under baseplates and bearing plates prior to installation of secondary framing.
- F Erection shall be in accordance with AISC Code of Standard Practice.
- G Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings".
- H Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of base plate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- I Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- J Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
- K Splice members only where indicated.

- L Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- M Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1.
- N Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- O Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.07 FIELD CONNECTIONS

- A High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened Pretensioned.
- B Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.08 REPAIRS AND PROTECTION

- A Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

End of Section

SECTION 05 21 00 – STEEL JOISTS

PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, equipment, and supervision to design, fabricate, deliver, and install steel joists as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 DEFINITIONS:

- A SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.04 SUBMITTALS:

- A Meet the requirements of Structural Shop Drafting by AISC for shop drawings.
- B Provide calculations and/or certifications showing compliance with all design criteria stated in these specifications and noted in the Drawings.
- C Product Data: For each type of joist, accessory, and product indicated.
- D Shop Drawings: Show layout, designation, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
 - 1. Indicate locations and details of bearing plates to be embedded in other construction.
 - 2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.
- E Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.
- F Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.

1.05 QUALITY ASSURANCE:

- A Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."
 - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
- C Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.06 FIELD QUALITY CONTROL/SPECIAL INSPECTIONS:

- A The Owner will engage a qualified Special Inspector to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform tests and inspections and prepare test and inspection reports.
- C Field welds will be visually inspected according to AWS D1.1/D1.1M.
- D In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable if noted on the drawings:
 - 1. Radiographic Testing: ASTM E 94.
 - 2. Magnetic Particle Inspection: ASTM E 709.
 - 3. Ultrasonic Testing: ASTM E 164.
 - 4. Liquid Penetrant Inspection: ASTM E 165.
- E Bolted connections will be visually inspected.
- F High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- G Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- H Additional testing will be performed to determine compliance of corrected Work with specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING:

- A Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.08 SEQUENCING:

- A Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

PART II PRODUCTS

2.01 JOISTS:

- A Design joists for the loads indicated on the Drawings.
- B Use SJI standard camber unless the Drawings indicate otherwise; negative camber is unacceptable.

2.02 FASTENERS:

- A ASTM A325 or A490 structural bolts, nuts and hardened washers.

2.03 BRIDGING:

- A Standard of joist manufacturer, except as noted otherwise on the drawings.

2.04 SHOP PRIMER:

A Light gray chromate or red oxide primer, 2 mil dry thickness.

2.05 MATERIALS

A Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.

B Steel Bearing Plates: ASTM A 36/A 36M.

C Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, uncoated

D High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Plain.

E Welding Electrodes: Comply with AWS standards.

2.06 PRIMERS

A Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.07 K-SERIES STEEL JOISTS

A Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

1. Joist Type: K-series steel joists and KCS-type K-series steel joists.

B Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

D Provide holes in chord members for connecting and securing other construction to joists.

E Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

F Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

G Camber joists according to SJI's "Specifications."

H Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.08 LONG-SPAN STEEL JOISTS

A Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:

1. Joist Type: LH-series steel joists and DLH-series steel joists.
 2. End Arrangement: Underslung /Square as noted on drawings.
 3. Top-Chord Arrangement: Parallel.
- B Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C Provide holes in chord members for connecting and securing other construction to joists.
- D Camber long-span steel joists according to SJI's "Specifications."
- E Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.09 JOIST GIRDERS

- A Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as follows:
1. End Arrangement: Underslung with bottom-chord extensions or as noted on the drawings.
 2. Top-Chord Arrangement: Parallel.
- B Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C Provide holes in chord members for connecting and securing other construction to joist girders.
- D Camber joist girders according to SJI's "Specifications."
- E Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.10 JOIST ACCESSORIES

- A Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- B Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- C Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface, unless otherwise indicated.
- D Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.11 CLEANING AND SHOP PAINTING

- A Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick.

PART III EXECUTION

3.01 EXAMINATION:

- A Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 FABRICATION:

- A Fabricate joists completely in the shop according to the latest SJI standards.
- B Joists may be fabricated from hot or cold formed sections of strip or sheet steel.

3.03 INSTALLATION:

- A Do not start placement until supporting work is in place and secured.
- B Install and secure joists and permanent bridging before construction loading. Provide for distribution of temporary loading. Bar joists and joist girders to be erected per OSHA 1926.750.
- C Joists shall bear not less than 4 inches on masonry or concrete and not less than 2-1/2 inches on steel.
- D Coordinate the delivery of products with that of other materials. Avoid damage during unloading, storing, or erecting. Replace damaged joists.
- E Leave members clean. Touch up the shop coat in the field.
- F Do not install joists until supporting construction is in place and secured.
- G Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
1. Before installation, splice joists delivered to Project site in more than one piece.
 2. Space, adjust, and align joists accurately in location before permanently fastening.
 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- H Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- I Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- J Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.04 REPAIRS AND PROTECTION:

- A Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists abutting structural steel, and accessories.
 - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

End of Section

SECTION 05 31 00 – STEEL ROOF DECKING

PART I GENERAL

1.01 SCOPE:

- A The work required under this specification consists of all steel roof decking.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	05 12 00	Structural Steel
Section	05 21 00	Steel Joists
Section	09 91 00	Painting

1.03 CODES AND STANDARDS:

- A Comply with the provisions of the following codes and standards:
1. AISI "Specification for the Design of Cold-Formed Steel Structural Members" (Standard Specifications).
 2. AWS D1.3 "Structural Welding Code-Steel" and AWS D1.3 "Structural Welding Code – Sheet Steel".
 3. ASTM A-611.

1.04 SUBMITTALS:

- A For information only, submit 2 copies of manufacturer's specifications and installation instructions for each product specified. Include manufacturer's certification as may be required to show compliance with these specifications. Indicate by transmittal form that a copy of each instruction has been distributed to the Installer.
- B Submit detailed shop drawings showing layout and types of deck panels, anchorage details, and every condition requiring closure panels, supplementary framing, cut openings, special jointing or other accessories.

PART II PRODUCTS

2.01 STEEL ROOF DECK:

- A Steel roof deck units shall be fabricated from steel conforming to Section 1.2 of the latest edition of the Standard Specifications.
- B Deck to be Type "B" or "F". Decks indicated for applicable acoustic properties to be Type "BA".
- C Depth, gauge, and finish shall be as specified on the drawings.

PART III EXECUTION

3.01 INSPECTION:

- A Installer must examine the areas and conditions under which deck is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 INSTALLATION:

- A All new roof areas shall be covered with steel roof deck unless noted otherwise in the Drawings.
- B Form metal units in lengths to be supported by 3 or more supports, where applicable, with lapped ends (2" minimum) and nested side laps. Units shall be erected and welded to supports in accordance with manufacturer's specifications in a pattern as noted on the drawings.
- C Place form units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned before being permanently fastened. Do not stretch or contract side lap interlocks. Place units flat and square without warp or excessive deflection.
- D Place deck bundles in such a manner as to not exceed allowable load capacity of structural framing.
- E Do not use deck units for storage or working platforms until permanently secured and do not exceed manufacturer's specified load capacity of deck.
- F Reinforce deck at openings without structural supports along all edges by means of one piece, flat sheet of 18 gauge (min.) of material of the same type and finish as the deck. Reinforcing shall be a minimum of at least 12" wide. Weld reinforcing to the forms at each corner and at intervals not exceeding 6" o.c.
- G Comply with AWS requirements and procedures for welding.
- H After installation, clean and patch the finish of scarred, welded, or rusted areas of the forms and supporting structure.

End of Section

SECTION 05 40 00 – COLD FORMED METAL FRAMING AND SHEATHING:

PART I GENERAL

1.01 SCOPE

- A Furnish all labor, material, equipment and supervision necessary to furnish and install gypsum sheathing and structural metal stud framing and fasteners at all exterior walls as specified herein as shown on the drawings and as specified herein.
1. Furnish and install structural metal stud fabricated roof trusses.
 2. Furnish and install air infiltration barrier and flexible flashing at window openings.
 3. Insulate voids in metal stud assemblies during fabrication which would be inaccessible for installation of insulation at a later date.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	07 21 00	Building Insulation
Section	09 22 16	Metal Support Systems
Section	09 29 00	Gypsum Wallboard
Division	22	Plumbing
Division	23	Heating Ventilating and Air Conditioning
Division	26	Electrical
Division	27	Communications

1.03 SUBMITTALS:

- A Submit Manufacturer's data on sheathing and framing in accordance with Section 013300.

1.04 QUALITY ASSURANCE:

- A This project has been designed based on allowable loads and construction standards of (SSMA) Steel Stud Manufacturer's Association. To be considered as an equal product, the Contractor shall submit product data, installation details, and any other supplemental information required by the Structural Engineer in accordance with Section 013300.
- B Structural steel studs shall be inspected by the Architect before they are to be concealed.
- C All structural steel studs and joists shall be factory color coded to provide a suitable visible means of field checking for proper location of gauge material.
- D Installer Qualifications: An experienced installer who has completed cold-formed metal framing 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.
- E Splices in studs shall not be permitted.
- F Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.
- G 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 installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

- H Mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and galvanized-coating thickness.
- I Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- J AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" or "Load and Resistance Factor Design Specification for Cold-Formed Steel Structural Members" and the following for calculating structural characteristics of cold-formed metal framing:

1. CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections."

1.05 PERFORMANCE REQUIREMENTS:

- A Structural Performance: Provide cold-formed metal framing capable of withstanding design loads indicated on the drawings within limits and under conditions indicated.
- B Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
1. Exterior Load-Bearing Wall Framing: Horizontal deflection of L/360 of the wall height.
 2. Exterior Load-Bearing Wall Framing With Brick Veneer: Horizontal deflection of L/600 of the wall height.
 3. Roof Trusses: Vertical deflection of 1/240 of the span.
- C Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120° F .

PART II PRODUCTS

2.01 MATERIALS:

- A Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: 33, Class 1.
 2. Grade: 33 for minimum uncoated steel thickness of 0.0428 inch and less; 50 Class 1 for minimum uncoated steel thickness of 0.0538 inch (1.37 mm) and greater.
 3. Coating: G60.
- B All members shall be designed in accordance with American iron and Steel institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members".
- C All framing members shall be formed from corrosion-resistant steel, corresponding to the requirements of AS5M A653, with a minimum yield strength of 40 ksi for studs, 33 ksi for runners.
- D Top and bottom track are to be the same gauge as the studs.
- E Framing members not scheduled otherwise on the drawings shall be not than less than 43 mils.
- F Steel studs shall be of size and gauge shown on the drawings. Studs not sized on the drawings shall be a minimum of 43 mils.
- G Sheathing shall be 5/8" x 48" x 96" long fire resistant, water resistant glass fiber reinforced Dens-Glass Gold as manufactured by Georgia Pacific, Fiberock aquatough sheathing as manufactured

by Unites States Gypsum Co., Gold Bond® Extended Exposure Gypsum Sheathing by National Gypsum company, or GlasRock™ sheathing by CertainTeed Gypsum.

2.02 AIR-INFILTRATION BARRIER:

A Proprietary building wrap with flame-spread and smoke-developed ratings of less than 25 and 450, respectively, when tested according to ASTM E 84. Provide one of the following products:

1. Spun Bonded Polyethylene sheet with aluminum coating on one face, formed by spinning continuous strands of fine, high-density-polyethylene interconnected fibers and bonding them together by heat and pressure; incorporating an additive to provide ultraviolet light resistance for up to 120 days; and with a water-vapor transmission rate equaling 535 g through 1 sq. m of surface in 24 hours according to ASTM E 96, Desiccant Method (Method A).
 - a. Product: Subject to compliance with requirements, provide "Tyvek ThermaWrap™" by DuPont Company.
2. Effective R-value: R-2 (including ¾" minimum airspace), as designated on ASHRAE tables, ASTM Handbook of Fundamentals, Chapter 25- Table 3.
3. Air Penetration: 0.001 cfm/ft2 at 1.57 psf, when tested in accordance with ASTM E 2178.
4. Water Vapor Transmission: 36 perms, when tested in accordance with ASTM E 96, Method B.
5. Water Penetration Resistance: 210 cm when tested in accordance with AATCC Test Method 127.
6. Basis Weight: 2.6 oz/yd2, when tested in accordance with TAPPI Test Method T-410.
7. Air Resistance: Air infiltration at >1000 seconds, when tested in accordance with TAPPI Test Method T-460.
8. Tensile Strength: 29/27 lbs/in., when tested in accordance with ASTM D 882, Method A.
9. Tear Resistance: 12/7 lbs., when tested in accordance with ASTM D 1117.

B. Accessories:

1. Seam Tape: DuPont™ Tyvek® Metallized Tape or DuPont™ Tyvek® Tape as manufactured by DuPont.
 - a. Fasteners:
 - i. Steel Frame Construction: Tyvek® Wrap Cap Screws, as manufactured by DuPont: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners.
 - ii. Wood Frame Construction: Tyvek® Wrap Caps, as manufactured by DuPont Building Innovations: #4 nails with large 1-inch plastic cap fasteners or 1-inch cap staples.
 - b. Sealants : Provide sealants as recommended by the weather barrier manufacturer that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
 - c. Adhesives: Provide adhesive recommended by weather barrier manufacturer.

- C. Flashing: DuPont™ FlexWrap™, as manufactured by DuPont or other approved flexible membrane flashing materials for window openings and penetrations.

2.03 ROOF TRUSSES:

- A Roof Truss Members: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, complying with ASTM C 955, and as follows:

1. Minimum Uncoated-Steel Thickness: 0.0329 inch.
2. Flange Width: 2 inches minimum.

2.04 FRAMING ACCESSORIES:

- A Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa).

- B Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. End clips.
5. Gusset plates.
6. Joist hangers and end closures.

2.05 ANCHORS, CLIPS, AND FASTENERS:

- A Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

- B Anchor Bolts: ASTM F 1554, Grade 36 threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

- C Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

- D Welding Electrodes: Comply with AWS standards.

2.06 MISCELLANEOUS MATERIALS:

- A Galvanizing Repair Paint: SSPC-Paint 20

2.07 FABRICATION:

- A Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

- a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
- 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.
- D. Insulate Voids in built-up components: Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume to a density equaling approximately 2.5 lb/cu. ft. (40 kg/cu. m).
 - 1. Contractor may use Foamed in place insulation in lieu of glass fiber insulation to insulate voids in built-up components.
 - a. Foamed-In Place Insulation: Two component thermal insulation combining a plastic resin and catalyst foaming agent surfactant, properly mixed/ratioed and combined with compressed air to produce a cold-setting foam insulation in cores of hollow concrete masonry walls.
 - i. Thermal Values: Provide "R" 3.7 per inch min. @ 32 degrees F. mean.
 - ii. Density: Dry 0.5 lb/ft³.
 - iii. Flame Spread: 25
 - iv. Smoke Developed: < 450
 - v. Permeance at 3.5 inches thickness: 7.7 perms per inch or less per ASTM E96.
 - vi. Corrosion: Non-corrosive.
 - vii. Toxicity: Non-toxic.
 - 2. Acceptable Manufacturers:
 - i. PolyMaster, Inc. "PolyMaster® Incylthane 500".
 - ii. Tailored Chemical Products, Inc. "Core-Fill 500".

PART III EXECUTION

3.01 FRAMING:

- A Prior to fabrication of framing, the contractor shall submit fabrication and erection drawings to the architect.
- B All framing components shall be cut squarely for attachment to perpendicular members, or as required, for an angular fit against abutting members.

- C Axially loaded studs shall be installed in a manner which will assure that their ends are positioned against the inside of runner web prior to fastening.
- D Fastening of components shall be with self-drilling screws or welding. Screws shall be of sufficient size to insure the strength of the connection. Wire tying of components shall not be permitted. All welds shall be touched up with a zinc-rich paint.
- E Coordinate with Plumbing, Mechanical, Electrical, and Communications Subcontractors to build-in required blocking for wall mounted equipment and devices.

3.02 WALL FRAMING INSTALLATION:

- A Runners and studs shall be securely anchored to the supporting structure. Complete, uniform and level bearing support shall be provided for bottom runner.
- B Abutting lengths of runner shall each be securely anchored to a common structural element, butt-welded or spliced.
- C Studs shall be plumbed, aligned and securely attached to flanges of both upper and lower runners. Framing of wall openings shall include headers and supporting studs.
- D Temporary bracing, where required, shall be provided until erection is completed.
- E Resistance to bending and rotation about the minor axis shall be provided by sheathing per AISI Specification, Sec. 5.1, and diagonally brace stud wall at all corners (horizontal strap or cold-rolled channel bracing.) Additional studs, when necessary, shall be positioned as to resist the vertical components.
- F Splices in studs and cutouts in the flanges of studs shall not be permitted.
- G Provide additional bracing and anchorage as noted on the drawings.
- H Apply 4 foot wide gypsum sheathing vertically with long edges over studs with face out. Screw attach gypsum sheathing with 1 inch type screws spaced 3/8" from edges and approximately 8" O.C. at edges and in the field, unless otherwise noted on the drawings.
- I Provide slip connections allowing for vertical movement (1/2" unless noted otherwise on the drawings) of the structure without imposing vertical loads on non-load bearing studs. Submit process and detail prior to installation.

3.03 TRUSS INSTALLATION:

- A Do not install trusses until supporting construction is in place and is braced and secured.
- B Handling:
 - 1. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
 - 2. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
 - 3. Space, adjust, and align trusses in location before permanently fastening.
 - 4. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.
- C Truss Spacing: As indicated on approved shop drawings.
- D Do not alter, cut, or remove framing members or connections of trusses.

- E Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated. Securely connect each truss ply required for forming built-up girder trusses
- F Erect trusses without damaging framing members or connections.
- G Install continuous bridging and permanently brace trusses as indicated on Shop Drawings.
- H Fastening:
 - 1. Anchor trusses securely at all bearing points using metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
 - 2. Anchor trusses to girder trusses as shown on approved shop drawings.
 - 3. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
- I Return trusses that are damaged or do not meet requirements to fabricator and replace with trusses that do meet requirements.
- J Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

3.04 GYPSUM SHEATHING INSTALLATION:

- A General: Install gypsum sheathing to comply with GA-253 and manufacturer's written instructions.
- B Cut boards at penetrations, edges, and other obstructions of the work; fit tightly against abutting construction, except provide a 3/8-inch (9-mm) setback where non-load-bearing construction abuts structural elements.
- C Coordinate sheathing installation with flashing and joint sealant installation so these materials are installed in the sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
- D Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.
- E Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.
- F Horizontal Installation: Install 24-inch- (610-mm-) wide gypsum sheathing boards horizontally with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud at approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9 mm) from edges and ends of boards.
 - 1. Vertical Installation: Install 48-inch- (1219-mm-) wide gypsum sheathing boards vertically with vertical edges centered over flanges of steel studs. Abut ends and edges of each board with those of adjacent boards. Screw-attach boards at perimeter and within field of board to each steel stud at approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9 mm)

- G Sealing Sheathing Joints: Seal joints according to sheathing manufacturer's written recommendations and as follows:

1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed sealant in entire face of tape. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.05 INSTALLATION - WEATHER BARRIER:

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.
- B. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations
- C. Install weather barrier prior to installation of windows and doors.
- D. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- E. Install weather barrier silver side facing air space.
- F. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level
- G. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- H. Window and Door Openings: Extend weather barrier completely over openings.
- I. Overlap weather barrier
1. Exterior corners: minimum 12 inches.
2. Seams: minimum 6 inches.
- J. Weather Barrier Attachment:
1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
- K. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- L. Seal any tears or cuts as recommended by weather barrier manufacturer.
- M. Opening Preparation:
1. Cut weather barrier in a modified "I-cut" pattern.
2. Cut weather barrier horizontally along the bottom of the header.
3. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
4. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.

5. Fold side and bottom weather barrier flaps into window opening and fasten.
6. Cut a head flap at 45-degree angle in weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

N. Flashing:

1. Cut 9-inch for metal stud construction wide flashing tape a minimum of 12 inches longer than width of sill rough opening.
2. Cover horizontal sill by aligning flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
3. Fan flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
4. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
5. Install window according to manufacturer's instructions.
6. Apply 4-inch wide strips of flashing at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
7. Apply 4-inch wide strip of flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
8. Position weather barrier head flap across head flashing. Adhere using 4-inch wide flashing over the 45-degree seams.
9. Tape head flap in accordance with manufacturer recommendations
10. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

End of Section

SECTION 05 50 00 – SHOP FABRICATED METAL

PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, tools, equipment, coordination, supervision services, etc., as required for complete performance of the work as shown on the drawings and specified herein.
- B In General this Section Includes the Following: Fabricate and deliver rough hardware, steel stair framing and stair handrails, and other miscellaneous shop fabricated steel items not supplied with other supplied steel fabrications.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 05 12 00 Structural Steel

1.03 SUBMITTALS:

- A Shop drawings detailing fabrication and erection of each metal fabrication. Include plans, elevations, sections and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections. Welder's certificates signed by Contractor certifying that welders comply with requirements specified herein.

1.04 QUALITY ASSURANCE:

- A Fabrication firm shall have experience at successfully producing metal fabrications similar to those indicated, and have sufficient production capacity to produce required work without causing delay.
- B Installation of each item shall be performed by same firm that fabricated them.
- C Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel", D1.3 "Structural Welding Code – Sheet Steel".
- D Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved, and if pertinent, has undergone re-certification.

PART II PRODUCTS

2.01 MATERIALS:

- A Cast Iron: Clean, tough gray iron free from blow holes, cinder spots or cold shuts. Conforming to ASTM Specifications.
- B Wrought Iron: (1) Plates, ASTM A52; Sheet, ASTM A162; and Bolts, Rods, Bars, ASTM A141.
- C Structural Steel: ASTM A36.
- D Aluminum: Type recommended by manufacturer unless specifically noted.

2.02 SHOP PAINT:

- A All ferrous metal items shall be painted one coat of rust inhibitive shop primer except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application specification No. 1" for shop painting.

2.03 BOLTS AND ANCHORS:

- A Furnish and install all bolts, anchors, expansion bolts, etc., as needed to properly install all items of work, including woodwork, etc.
- B Joints: Tightly fitted, finished smooth and even concealed where possible, rivets countersunk on exposed surfaces. No drifting.
1. Steel: Riveted or welded.
 2. Castings: Concealed bolts or cap screws counter-sunk on face.
 3. Wrought Iron: Welded or machine screws.
 4. Exterior Work: Shed water and prevent entrance to hollow work.
 5. Aluminum: Welded, ground and buffed for flush machine screws.

2.04 EQUIPMENT SUPPORTS:

- A Provide equipment supports of structural shapes where shown and as detailed and where not furnished by equipment contractors.

2.05 METAL HANDRAILS:

- A Materials: Standard steel pipe and steel bar of size indicated, cast or malleable iron flanges. Provide handrails both sides of all stairs and mechanical walkway, and at one side of the walking track.
- B Joints: Welded, ground smooth.
- C Setting: Weld to structure and provide welded flanges at walls. Expansion bolt all flanges with countersunk flat head bolts.

2.06 STEEL LINTEL ANGLES FOR OPENINGS IN MASONRY:

- A Unless otherwise shown, loose lintels shall be 16 inches larger than the masonry to masonry opening over which they occur. Unless otherwise shown, they shall be 6 inch by 3-1/2 inch by 3/8 inch angles, one for each 4 inches of wall thickness. Furnish other miscellaneous structural shapes to be built by masons or other trades which are not elsewhere specified.

2.07 LADDERS:

- A Rungs: 1 inch diameter steel bar stock with anti-slip, non-gritted, steel metallized abrasive surface. Grade #2 Medium as manufactured by W. S. Molnar Company, Detroit, Michigan or approved substitute.
- B Other Materials: Standard steel bar or miscellaneous shapes of sizes indicated.
- C Joints: Welded, ground smooth.
- D Floor expansion bolts shall be 1/2", equal to Para-sleeve concrete anchors.

2.08 STEEL STAIRS:

- A Stringers, supports and connections for steel stairs shall be designed to sustain a live load of not less than 100 pounds per square foot. Treads shall be designed to carry a minimum concentrated load of 300 pounds on the centerline of tread span.

- B Stringers shall be 12" x 1-1/2" x 10.6# channels minimum. Exposed open ends of stringers shall be closed by filler plates welded in place.
- C Interior stair treads, unless noted otherwise, shall be designed to receive cement fill.
1. Interior risers shall be closed with #12 gauge sheet steel riser plates secured to treads by bolting.
 2. Stair Treads at equipment mezzanines shall be galvanized rectangular bar steel grate treads with checker plate nosing similar to type SGW treads as manufactured by the McNichols Co. (800) 237-820.
- D Stair railings, unless otherwise noted, shall be fabricated of 1-1/2" O.D. black steel pipe. Railings shall be supported from stringers except where walls are adjacent to railings.
1. At locations indicated to receive wood handrails 2" or less in width, provide Wagner Companies #1806 supports (3-1/4 in. wall-to-center, 1-1/2 in. drop, #4 satin finish, aluminum alloy 535) spaced as recommended by the manufacturer unless otherwise noted on drawings.
 2. At locations indicated to receive steel handrails 2" or less in width, provide Sharpe Products #7335R supports (3-1/4 in. wall-to-center, 1-1/2 in. drop, formed 1/4" steel) finished to match handrails and spaced as recommended by the manufacturer unless otherwise noted on drawings.
 3. Pickets at railings supported from stringers shall be spaced as required to prevent the passage of a 4 inch diameter sphere.
- E Provide any necessary light I-beam, channel, angle or tee framing, hangers, etc., at various floor and platform levels to properly receive the stair construction.
- F Wall stringers shall continue around platforms, forming a base 4" high.
- G Bracket angles for treads and risers shall be at least 1-1/4" x 1-1/4" x 3/16" angles, welded to stringers.
- H Platforms shall be of not less than #12 gauge sheet steel. Support platforms on rolled tees spaced not over 30" on center. Tees shall be WT 2.5 x 8 for spans up to 5'-0". Longer spans shall be designed for a live load of 100 lbs. per sq. ft. Platforms shall be welded to tees.
- I All joints shall be ground smooth.

2.09 HINGES FOR DUMPSTER PAD GATES:

- A Hinges shall be heavy duty barrel hinges similar and equal to BRHC7-212 as manufactured by Tennessee Fabricating Company, 2025 York Avenue, Memphis TN 38104, Phone: (901) 725-1548, Fax: (901) 725-5954. Hinges shall have 7" x 1-1/2" Barrel Diameter, 3/4" stainless steel pin, load capacity per pair: 2,200 lbs.

2.10 GROUT AND ANCHORING CEMENT:

- A Non-Shrink, Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CECRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- B Interior Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water in field to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

- C Erosion Resistant Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water in field to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by sealer or waterproof coating and is recommended for exterior use by manufacturer.
- D Subject to compliance with requirements, acceptable products include, but are not limited to, the following:
1. Non-Shrink, Non-Metallic Grouts:
 - "Bonsal Construction Grout": W.R. Bonsal Co.
 - "Diamond-Crete Grout": Concrete Service Materials
 - "Euco N-S Grout": Euclid Chemical Co.
 - "Kemset": Chem-Masters Corp.
 - "Crystex": L & M Construction Chemicals, Inc.
 - "Masterflow 713": Master Builders
 - "Sealtight 588 Grout": W.R. Meadows, Inc.
 - "SonogROUT": Sonneborn Building Products Div. Rexnord Chemical Products Inc.
 - "Five Star Grout": U.S. Grout Corp.
 - "Vibropruf #11": Lambert Corp.
 2. Interior Anchoring Cement:
 - "Bonsal Anchor Cement": W.R. Bonsal Co.
 - "Pro-Rok": Minwax Construction Products Div.
 - "Masterflow 928 and 713": Master Builders
 - "Euco N-S Grout": Euclid Chemical Co.
 - "Sealtight 588 Grout": W.R. Meadows Inc.
 3. Erosion -Resistant Anchoring Cement:
 - "super Por-Rok": Minwax Construction Products Div.
 - "Bonsal Anchor Cement": W.R. Bonsal Co.
 - "Thorogrip": Thoro Systems Products

2.11 FASTENERS:

- A Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for their intended use, type, grade, and class required.
1. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
 2. Lag Bolts: Square head type, FS FF-B-561.
 3. Machine Screws: Cadmium plated steel, FS FF-S-92.
 4. Wood Screws: Flat head carbon steel, FS FF-S-111.
 5. Plain Washers: Round, carbon steel, FS FF-W-92.
- B Drilled-In Expansion Anchors: Complying with FS FF-S-325, Group VIII (anchors, expansions, {non-drilling}), Type I (internally threaded tubular expansion anchor), and machine bolts complying with FS FF-B575, Grade 5.
1. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
 2. Lock Washers: Helical spring type, carbon steel, FS FF-W-84.
 3. Ferrous Metal Shop Primer: Manufacturer's or Fabricator's standard, fast-curing, lead-free, universal modified alkyd primer; selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated and for capability to provide

- a sound foundation for field-applied topcoats despite prolonged exposure; complying with performance requirements of FS TT-P-645
4. Galvanized Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.
 5. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint-12 except containing no asbestos fibers.

2.12 FABRICATION:

- A Fabricate items from materials of size, thickness, and shapes indicated by not less than that required to comply with performance indicated. Work to dimensions indicated or accepted on shop drawings, using proven details for fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B Fabricate exposed work true to line and level, with accurate angles and surfaces, and straight sharp edges.
- C Allow for thermal movement through a maximum ambient temperature change (range) of 100° F (55.5° C) in the design, fabrication, and installation of assemblies, without buckling, opening up of joints, and overstressing of welds of welds and fasteners. Base design calculations of actual surface temperatures of metals due to both solar heat gain and night time heat loss.
- D Shear and punch metals cleanly and accurately. Remove burrs.
- E Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F Remove sharp or rough areas on exposed traffic surfaces.
- G Weld corners and seams continuously, complying with AWS recommendations and the following:
 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.
- H Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- I Provide anchorages of types indicated, coordinated with supporting substrates. Fabricate and space anchoring devices to provide adequate support for intended use.
- J Assemble items in shop to greatest extent possible. Partially fabricate only as necessary for shipping and handling limitations. Employ connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- K Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- L Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weeps where water may collect.

2.13 ROUGH HARDWARE:

- A Furnish/fabricate bent or otherwise custom fashioned bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing/supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Furnish straight bolts and other stock rough hardware items as specified in DIVISION 6 Sections.
- B Fabricate items to sizes shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, provide steel washers.

2.14 BEARING AND LEVELING PLATES:

- A For steel items bearing on masonry or concrete, provide loose bearing and leveling plates, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.15 FINISHES, GENERAL:

- A Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B Finish metal fabrications after assembly.

2.16 STEEL AND IRON FINISHES:

- A Galvanizing: For items indicated to be galvanized, apply zinc-coating by the hot-dip process in compliance with the following requirements:
 - 1. ASTM A 153 for galvanizing iron and steel hardware.
 - 2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.
- B Prepare uncoated ferrous metal surfaces for shop priming in compliance with the following requirements for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning".
 - 2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".
- C Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

PART III EXECUTION

3.01 INSTALLATION:

- A Install anchorage devices and fasteners necessary for securing miscellaneous metal fabrications to substrates; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
- B Perform cutting, drilling and fitting for installation of miscellaneous metal fabrications. From established lines and levels, locate and align fabrication accurately, at proper elevation, with edges and surfaces level, plumb, true and free of rack.

- C Temporarily brace anchors which are to be built into concrete, masonry or similar construction.
- D Fit exposed connections accurately together to form hairline joints. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior galvanized items, and those intended for bolted or screwed field connections.
- E For field welds, comply with AWS Code for procedures of manual shielded metal-arc welding, in appearance and quality of welds made, and methods used in correcting welding work.
- F Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- G Obtain fusion without undercut or overlap. Remove welding flux immediately.
- H At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour matches adjacent surface.

3.02 SETTING LOOSE PLATES:

- A Clean concrete and masonry bearing surfaces of foreign matter and roughen to improve bonding. Clean bonding surface of bearing plates.
- B Set plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. do not remove shims; if protruding, cut-off flush with edge of bearing plate before packing with grout. Pack grout leaving no voids between bearing surface and plate.
- C Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic, non-shrink grout in exposed locations, unless otherwise indicated.

3.03 ADJUSTING AND CLEANING:

- A Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same materials as used for shop painting. Comply with SSPC-PA1 requirements for touch-up of field painted surfaces. Apply by brush or spray to provide a minimum dry thickness of 2.0 mils.
- B Clean field welds, bolted connections and abraded areas of galvanized items and apply galvanizing repair paint in compliance with ASTM A 780.

End of Section

SECTION 05 51 33 - METAL LADDERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, material, equipment, and supervision to provide and install aluminum fixed vertical ladders.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 REFERENCES

- A. ANSI A14.3: Ladders - Fixed - Safety Requirements.
- B. OSHA 1910.23: Ladders.

1.04 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data : Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings for Ladders: Plan and section of ladder installation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products until installation inside under cover. If stored outside, under a tarp or suitable cover.

1.06 WARRANTY

- A. Limited Warranty: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: Precision Ladders, LLC, Morristown, TN; 800-225-7814; 423-586-2265; Email: info@PrecisionLadders.com; www.PrecisionLadders.com
- B. Additional alternate manufacturers approved to provide product equal to or exceeding specified requirements are Alaco Ladder Co., and O'Keeffe's. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements.

2.02 ALUMINUM FIXED VERTICAL LADDER

- A. Aluminum Fixed Vertical Ladder and Components: Ladder, cage, rest platforms, floor mounting brackets, security doors, walk-thru, and side rails.
1. Model: Aluminum Fixed Vertical Ladder as manufactured by Precision Ladders.
 2. Capacity: Unit shall support a 1500 lb (680 kg) loading without failure, and individual treads shall withstand a 3,000 lb (1361 kg) loading without failure.
 3. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3 and OSHA 1910.27.
- B. Components:
1. Ladder Stringer: 2-1/2 inch by 1-1/16 inch by 1/8 inch (64 mm by 27 mm by 3 mm) extruded 6005-T5 aluminum channel. Pitch: 90 degrees.
 2. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch (57 mm by 19 mm by 6 mm) extruded 6005-T5 aluminum with deeply serrated top surface.
 3. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick (216 mm by 51 mm by 76 mm by 6 mm) aluminum angle.
 4. Walk-Thru:
 - a. Hand Rails: 1-1/4 inch (32 mm) aluminum square tube with rounded edges.
 - b. Mounting Brackets: 4 inch by 4 inch by 1/4 inch (102 mm by 102 mm by 6 mm) aluminum.
 - c. Side Rails: 42 inch (1067 mm) side rail extension for through ladder exits.
 5. Safety Cage: Vertical and horizontal bars: 1/4 inch by 2 inch (6 mm by 51 mm) 6005-T5 aluminum flat bar.
 6. Rest Platform:
 - a. 1/8 inch (3 mm) aluminum tread plate.
 - b. Platform Size: 30" inches by 48 inches (762 mm by 1219 mm) standard.
 - c. Toe Boards. 6005 T-5 aluminum.
 - d. Handrails: 1-1/4 inch (32 mm) aluminum square tube 42 inches (1067 mm) high.
 7. Security Door: 0.125 inch (3 mm) 3003-H14 aluminum panel 84 inches (2134 mm) tall with padlock provision.
 8. Security Gate: Hinged gate at bottom of cage with padlock provision.
 9. Fall Prevention System: Complete system with rail, sleeves, and harness to limit any fall to 6 inches (152 mm) or less.
 10. Floor Brackets: Floor bracket at foot of each stringer, 3 by 2 by 1/4 inch (76 by 51 by 6 mm).
 11. Finishes: As indicated on drawings. If a color is indicated or if indicated to be "pre-finished" provide Powder Coated finish. If not indicated, provide Mill Finish.

2.03 FABRICATION

- A. Completely fabricate ladder ready for installation before shipment to the site.

- B. Completely fabricate handrail components and ship to site ready for field assembly and attachment to ladder.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.03 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

End of Section

SECTION 06 10 00 - ROUGH CARPENTRY

1 PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment and supervision necessary to perform all work traditionally performed by Carpenter including furnishing and installing rough carpentry as herein specified and shown on the drawings as necessary to complete the work.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	06 22 00	Millwork
Section	09 91 00	Painting

1.03 SUBMITTALS:

- A. Submit shop drawings on fabricated items.
- B. Pressure treated wood: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance to applicable standards.
- C. Preservation treated wood: Submit certification for waterborne preservative that moisture content was reduced to moisture content specified elsewhere in this section.

1.04 REFERENCES:

- A. Applicable Standards:
 - 1. American Plywood Association (APA), current standards.
 - 2. American Society for Testing and Materials (ASTM), standards as referenced herein.
 - 3. American Wood Preservers Association (AWPA), standards as referenced herein.
 - 4. Product Standards (PS) of the National Bureau of Standards, U.S. Department of Commerce, PS 20-99 for softwood lumber and PS 1-83 for softwood plywood.
- B. Grading rules; current rules of the following associations applicable to wood materials:
 - 1. Southern Pine Inspection Bureau (SPIB).
 - 2. Western Wood Products Association (WWPA).
 - 3. West Coast Lumber Inspection Bureau (WCLIB).
 - 4. National Lumber Grades Authority (NLGA).

1.05 QUALITY ASSURANCE:

- A. Lumber: Lumber shall bear the grade stamp of a listed grading rules association certified by the Board of Review of the American Lumber Standards Committee (ALSC), identifying species or species combination, grade, moisture content at time of surfacing, mill origin and grading agency.
- B. Plywood: Plywood shall bear the stamp of American Plywood Association (APA), indicating type, grade, thickness, exposure durability, span rating, species group, edging, surface finish, and regulatory agency compliance.
- C. Pressure-preservative-treated wood materials: Pressure-preservative-treated lumber and plywood shall bear the quality standard stamp of the applicator indicating compliance with AWPA

standards, preservative type used, retention level, exposure conditions, treating company and plant location, year of treatment and name of certified treatment inspection agency.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to project site and place in areas protected from the weather.
- B. Store materials minimum 6" off of ground or floor on level blocking. Cover with waterproof sheets or tarps if stored outdoors. Provide for adequate air circulation and ventilation when covering materials. Do not store seasoned materials in wet or damp areas of building.
- C. Protect edges, ends, corners and surfaces of sheet materials from damage.

2 PART II PRODUCTS

2.01 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.
- B. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- C. Framing: Grade No. 1 of any species with the required modulus of elasticity and extreme fiber stress in bending as indicated on structural drawings or approved by Engineer.

2.02 BOARDS

- A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 15 percent maximum moisture content and of on of the following species and grade:
 - 1. Eastern softwoods, No. 3 Common per NELMA rules.
 - 2. Northern species, No. 3 Common or Standard per NLGA rules.
 - 3. Mixed southern pine, No. 2 per SPIB rules.
 - 4. Hem-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
 - 5. Spruce-pine-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
 - 6. Western woods, Standard per WCLIB rules or No. 3 Common per WWPA rules.

2.03 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 15 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.04 SHEET MATERIALS:

- A. Interior Plywood: Wall Surfaces: APA-rated A-D, Group 1, Interior, thickness as indicated; A-grade veneer face to exposed side.

- B. Exterior Plywood - Wall and/or Roof Sheathing: APA-rated Sheathing, Exposure 1, Span rating shall be as required for support spacing at each condition.
- C. Preservative-Treated Plywood: APA-rated Sheathing, Exposure 1, Series V-611, thickness as indicated; pressure-preservative-treated as specified herein.

2.05 TREATED WOOD MATERIAL:

- A. Preservative Treatment by Pressure Process: AWP C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWP C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium: Alkaline Copper Quat (ACQ), or Copper Azole (CA type A or B)
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings AND the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood floor plates, sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18" above the ground in crawlspaces or unexcavated areas.
- 5. Where Preservative treated wood is used in contact with metal other than G-90 hot dipped galvanized steel, a separation sheet of either 15-pound unperforated organic asphalt saturated roofing felt complying with ASTM D -226, or 10 mil polyethylene shall be placed between wood and metal to prevent corrosion from contact.

2.06 FIRE RETARDANT TREATED LUMBER:

- A. Comply with AWP C-27 as applicable. Process shall not promote premature degradation of wood products in the conditions in which fire-treated lumber/panels will be installed.
 - 1. Provide materials with maximum moisture content, after treatment, of 15% or less.
 - 2. Manufacturer: Provide "Dricon FRT" or "D-Blaze FRT" by Chemical Specialties Inc., with current warranty.

2.07 HARDWARE AND ACCESSORIES:

- A. Fasteners and accessories: Provide nails, bolts, nuts, washers, screws, expansion bolts, lag bolts, clips, powder-actuated fasteners, anchor bolts and similar hardware necessary for complete installation of rough carpentry materials.

- B. Nails, fasteners and anchors for treated wood materials: Hot-dipped galvanized or type 304 or 316 stainless steel.
- C. Fasteners for attachment of plywood to light gage steel framing: Corrosion-resistant, type S-12 bugle head self-drilling screws; length as required to extend minimum 1/2" through framing member.
- D. Construction adhesive: meeting APA Performance Specification AFG-01.

3 PART III EXECUTION

3.01 WORKMANSHIP:

- A. Install rough carpentry work cut square and straight to provide neat, fitted joints. Set to required levels and lines with members plumb, true, and aligned.
- B. Coordinate and lay out work to provide correct locations and opening to receive work of other trades.
- C. Install framing members aligned, leveled, plumbed and squared over bearing points.
- D. Secure carpentry work in place to substrates and supporting members using fasteners of types and sizes complying with building code requirements and as specified. Install fasteners without splitting wood and with positive anchorage into substrates or adjoining wood members.
- E. Anchor members rigid and secure to adequately resist design loads, maintaining proper alignment, free of warp or wind.
- F. Install linear runs of materials using longest lengths as practicable. Where multiple members are used to form linear runs, offset joints in member not less than three feet.
- G. Bolting: Drill holes 1/16" larger in diameter than bolt to be installed. Drill straight and true from one side only. Provide plates or washers between bolt head or nut and wood surface.
- H. Screws: Pre-bore holes same diameter as root of thread. Enlarge holes to shank diameter for length of shank.
- I. Make wood-to-wood fastenings with proper size cement coated nails.
- J. Install plywood and other sheet material in compliance with APA Design/Construction Guide - Residential and Commercial unless more stringent requirements are specified.

3.02 TREATED WOOD MATERIALS:

- A. Handle and install treated wood in accordance AWWA M4-84.
- B. Coat cut edges and ends of pressure-preservative-treated wood, including drilled holes with a brushed-applied solution of copper naphthenate containing minimum 2% metallic copper.
- C. Attach treated wood materials using hot-dipped galvanized or stainless steel fasteners, nails or anchors as specified.

3.03 PLATES, BLOCKING, NAILERS AND MISCELLANEOUS FRAMING:

- A. Install minimum 2" nominal thickness wood members to support and to provide as a substrate for attachment of finishing materials, trim, fixtures, accessories and specialty items. Cut blocking to fit snug between studs, wedge, align and anchor to framing by end nailing or toenailing.

- B. Anchor members to structural steel or metal framing using appropriate bolts spaced at 48" o.c. maximum.
- C. Anchor members to concrete or masonry construction using cast-in anchor bolts, powder-actuated studs or sleeve, wedge or expansion type anchors, spaced at 48" o.c. maximum.
- D. Provide linear members in maximum practical lengths to minimize joints. Install multiple linear members so joints are offset minimum 36".
- E. Install anchors and fasteners positioned to be located within 3" of ends of members.
- F. Attach furring at 12" o.c. to substrates with appropriate fasteners spaced at maximum, 24" o.c.
- G. Wood Framed Walls: Install minimum 2" thickness solid wood blocking or framing members to firestop all vertical and horizontal concealed draft opening to comply with governing building code requirements. Firestopping members shall be of sizes matching full width or depth of framing or structural members. Walls exceeding eight feet in height shall be laterally braced with nominal 2" solid blocking, same width as studs, installed continuous in horizontal row at mid-point of wall height.

3.04 CLEAN UP:

- A. Clean up debris and excess materials from this work and remove from site. Leave area broom clean.

End of Section

SECTION 06 10 00 - ROUGH CARPENTRY

PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment and supervision necessary to perform all work traditionally performed by Carpenter including furnishing and installing rough carpentry as herein specified and shown on the drawings as necessary to complete the work.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	06 22 00	Millwork
Section	09 91 00	Painting

1.03 SUBMITTALS:

- A. Submit shop drawings on fabricated items.
- B. Pressure treated wood: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance to applicable standards.
- C. Preservation treated wood: Submit certification for waterborne preservative that moisture content was reduced to moisture content specified elsewhere in this section.

1.04 REFERENCES:

- A. Applicable Standards:

1. American Plywood Association (APA), current standards.
2. American Society for Testing and Materials (ASTM), standards as referenced herein.
3. American Wood Preservers Association (AWPA), standards as referenced herein.
4. Product Standards (PS) of the National Bureau of Standards, U.S. Department of Commerce, PS 20-99 for softwood lumber and PS 1-83 for softwood plywood.

- B. Grading rules; current rules of the following associations applicable to wood materials:

1. Southern Pine Inspection Bureau (SPIB).
2. Western Wood Products Association (WWPA).
3. West Coast Lumber Inspection Bureau (WCLIB).
4. National Lumber Grades Authority (NLGA).

1.05 QUALITY ASSURANCE:

- A. Lumber: Lumber shall bear the grade stamp of a listed grading rules association certified by the Board of Review of the American Lumber Standards Committee (ALSC), identifying species or species combination, grade, moisture content at time of surfacing, mill origin and grading agency.
- B. Plywood: Plywood shall bear the stamp of American Plywood Association (APA), indicating type, grade, thickness, exposure durability, span rating, species group, edging, surface finish, and regulatory agency compliance.
- C. Pressure-preservative-treated wood materials: Pressure-preservative-treated lumber and plywood shall bear the quality standard stamp of the applicator indicating compliance with AWPA

standards, preservative type used, retention level, exposure conditions, treating company and plant location, year of treatment and name of certified treatment inspection agency.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to project site and place in areas protected from the weather.
- B. Store materials minimum 6" off of ground or floor on level blocking. Cover with waterproof sheets or tarps if stored outdoors. Provide for adequate air circulation and ventilation when covering materials. Do not store seasoned materials in wet or damp areas of building.
- C. Protect edges, ends, corners and surfaces of sheet materials from damage.

PART II PRODUCTS

2.01 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.
- B. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- C. Framing: Grade No. 1 of any species with the required modulus of elasticity and extreme fiber stress in bending as indicated on structural drawings or approved by Engineer.

2.02 BOARDS

- A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 15 percent maximum moisture content and of on of the following species and grade:
 - 1. Eastern softwoods, No. 3 Common per NELMA rules.
 - 2. Northern species, No. 3 Common or Standard per NLGA rules.
 - 3. Mixed southern pine, No. 2 per SPIB rules.
 - 4. Hem-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
 - 5. Spruce-pine-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
 - 6. Western woods, Standard per WCLIB rules or No. 3 Common per WWPA rules.

2.03 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 15 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.04 SHEET MATERIALS:

- A. Interior Plywood: Wall Surfaces: APA-rated A-D, Group 1, Interior, thickness as indicated; A-grade veneer face to exposed side.

- B. Exterior Plywood - Wall and/or Roof Sheathing: APA-rated Sheathing, Exposure 1, Span rating shall be as required for support spacing at each condition.
- C. Preservative-Treated Plywood: APA-rated Sheathing, Exposure 1, Series V-611, thickness as indicated; pressure-preservative-treated as specified herein.

2.05 TREATED WOOD MATERIAL:

- A. Preservative Treatment by Pressure Process: AWP C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWP C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium: Alkaline Copper Quat (ACQ), or Copper Azole (CA type A or B)
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings AND the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood floor plates, sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18" above the ground in crawlspaces or unexcavated areas.
- 5. Where Preservative treated wood is used in contact with metal other than G-90 hot dipped galvanized steel, a separation sheet of either 15-pound unperforated organic asphalt saturated roofing felt complying with ASTM D -226, or 10 mil polyethylene shall be placed between wood and metal to prevent corrosion from contact.

2.06 FIRE RETARDANT TREATED LUMBER:

- A. Comply with AWP C-27 as applicable. Process shall not promote premature degradation of wood products in the conditions in which fire-treated lumber/panels will be installed.
 - 1. Provide materials with maximum moisture content, after treatment, of 15% or less.
 - 2. Manufacturer: Provide "Dricon FRT" or "D-Blaze FRT" by Chemical Specialties Inc., with current warranty.

2.07 HARDWARE AND ACCESSORIES:

- A. Fasteners and accessories: Provide nails, bolts, nuts, washers, screws, expansion bolts, lag bolts, clips, powder-actuated fasteners, anchor bolts and similar hardware necessary for complete installation of rough carpentry materials.

- B. Nails, fasteners and anchors for treated wood materials: Hot-dipped galvanized or type 304 or 316 stainless steel.
- C. Fasteners for attachment of plywood to light gage steel framing: Corrosion-resistant, type S-12 bugle head self-drilling screws; length as required to extend minimum 1/2" through framing member.
- D. Construction adhesive: meeting APA Performance Specification AFG-01.

PART III EXECUTION

3.01 WORKMANSHIP:

- A. Install rough carpentry work cut square and straight to provide neat, fitted joints. Set to required levels and lines with members plumb, true, and aligned.
- B. Coordinate and lay out work to provide correct locations and opening to receive work of other trades.
- C. Install framing members aligned, leveled, plumbed and squared over bearing points.
- D. Secure carpentry work in place to substrates and supporting members using fasteners of types and sizes complying with building code requirements and as specified. Install fasteners without splitting wood and with positive anchorage into substrates or adjoining wood members.
- E. Anchor members rigid and secure to adequately resist design loads, maintaining proper alignment, free of warp or wind.
- F. Install linear runs of materials using longest lengths as practicable. Where multiple members are used to form linear runs, offset joints in member not less than three feet.
- G. Bolting: Drill holes 1/16" larger in diameter than bolt to be installed. Drill straight and true from one side only. Provide plates or washers between bolt head or nut and wood surface.
- H. Screws: Pre-bore holes same diameter as root of thread. Enlarge holes to shank diameter for length of shank.
- I. Make wood-to-wood fastenings with proper size cement coated nails.
- J. Install plywood and other sheet material in compliance with APA Design/Construction Guide - Residential and Commercial unless more stringent requirements are specified.

3.02 TREATED WOOD MATERIALS:

- A. Handle and install treated wood in accordance AWWA M4-84.
- B. Coat cut edges and ends of pressure-preservative-treated wood, including drilled holes with a brushed-applied solution of copper naphthenate containing minimum 2% metallic copper.
- C. Attach treated wood materials using hot-dipped galvanized or stainless steel fasteners, nails or anchors as specified.

3.03 PLATES, BLOCKING, NAILERS AND MISCELLANEOUS FRAMING:

- A. Install minimum 2" nominal thickness wood members to support and to provide as a substrate for attachment of finishing materials, trim, fixtures, accessories and specialty items. Cut blocking to fit snug between studs, wedge, align and anchor to framing by end nailing or toenailing.

- B. Anchor members to structural steel or metal framing using appropriate bolts spaced at 48" o.c. maximum.
- C. Anchor members to concrete or masonry construction using cast-in anchor bolts, powder-actuated studs or sleeve, wedge or expansion type anchors, spaced at 48" o.c. maximum.
- D. Provide linear members in maximum practical lengths to minimize joints. Install multiple linear members so joints are offset minimum 36".
- E. Install anchors and fasteners positioned to be located within 3" of ends of members.
- F. Attach furring at 12" o.c. to substrates with appropriate fasteners spaced at maximum, 24" o.c.
- G. Wood Framed Walls: Install minimum 2" thickness solid wood blocking or framing members to firestop all vertical and horizontal concealed draft opening to comply with governing building code requirements. Firestopping members shall be of sizes matching full width or depth of framing or structural members. Walls exceeding eight feet in height shall be laterally braced with nominal 2" solid blocking, same width as studs, installed continuous in horizontal row at mid-point of wall height.

3.04 CLEAN UP:

- A. Clean up debris and excess materials from this work and remove from site. Leave area broom clean.

End of Section

SECTION 06 22 00 – MILLWORK

1PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment, and supervision necessary to fabricate and provide millwork as shown on the drawings and specified herein.
- B. See drawings, schedules, and details for location, quantity and design of millwork required
- C. Millwork, as included in this section, is defined as follows, except as otherwise specifically noted. All shop fabricated cabinetry and counter-tops, including the installation of them as necessary to complete the work.
 - 1. Plastic laminate covered cabinetry.
 - 2. Wood cabinetry
 - 3. Plastic Laminate countertops.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	06 10 00	Rough Carpentry
Section	09 91 00	Painting

1.03 DEFINITIONS:

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.
- B. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stairwork are specified in Division 6 Section "Rough Carpentry."

1.04 SUBMITTALS:

- A. Product Data: For panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, cabinet hardware and accessories, handrail brackets and finishing materials and processes.
- B. Shop Drawings: Show 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 furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers and other items installed in architectural woodwork.
 - 4. Apply WI-certified compliance label to first page of Shop Drawings.
- C. Samples for Verification:
 - 1. Lumber with or for transparent finish, not less than 5 inches (125 mm) wide by 24 inches (600 mm) long, for each species and cut, finished on 1 side and 1 edge.

2. Veneer-faced panel products with or for transparent finish, 8 by 10 inches (200 by 250 mm) for each species and cut. Include at least one face-veneer seam and finish as specified.
3. Lumber and panel products with shop-applied opaque finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels, for each finish system and color, with 1/2 of exposed surface finished.
4. Corner pieces: Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
5. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
7. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.05 QUALITY ASSURANCE:

- A. Workmanship shall be of the best customarily done on work of this type. The intent is that joints be neatly and carefully made, surfaces straight and clean, work sanded with grain, all machine marks removed by sanding, except on exterior material which shall be cleanly machined. All cross scratches shall be eliminated. Shop assembled surfaces shall be glued where possible and shall be glue-blocked at concealed locations. All shelves shall be mortised and tenoned where possible, etc. All work shall conform to the quality standards of the Architectural Woodwork Industry (AWI) for custom grade.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance
 1. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork required to be of same species and finish.
 2. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - a. Provide AWI Quality Certification Program certificates indicating that woodwork, complies with requirements of grades specified.

1.06 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
 1. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
 2. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- a. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

2PART II PRODUCTS

2.01 MATERIALS:

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
 - 1. Wood Species and Cut for Transparent Finish: Red oak, plain sawn or sliced.
 - 2. Wood Species for Opaque Finish: Any closed-grain hardwood
 - 3. Retain paragraph and subparagraphs below if AWI standard is used or if requirements for wood products selected exceed those in WI standard. Delete standards for products not used.
 - 4. Wood Products: Comply with the following:
 - a. High-Density Fiberboard: ANSI A208.1, Industrial Grade (45 lb/ft³ density), made with binder containing no urea formaldehyde. Tops in kitchens and toilets (subject to moisture) shall be constructed of Extra® treated composite wood panels as manufactured by CMI 500 W. Monroe St. Suite 2010, Chicago IL 60661 Phone: 866-382-8701
 - i. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - b. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
 - i. Shelves exposed to view shall be 3/4" Red Oak plywood, DFPA A-B Grade with Red Oak edging unless noted otherwise.
 - ii. Shelving enclosed in closets or otherwise not exposed to view shall be fir plywood, DFPA A & B grade with Birch edging on all four edges.
 - iii. Finished wood and trim shall be solid wood, premium grade, Red Oak, unless otherwise noted with finish as scheduled in Division 9.
 - c. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - i. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi-exposed edges.
 - d. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - i. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - 1. Abet Laminati, Inc.
 - 2. Arborite; Division of ITW Canada, Inc.

3. Formica Corporation.
 4. Lamin-Art, Inc.
 5. Nevamar Company, LLC; Decorative Products Div.
 6. Panolam Industries International Incorporated.
 7. Westinghouse Electric Corp.; Specialty Products Div.
 8. Wilsonart International; Div. of Premark International, Inc.
5. Laminated plastic work shall be cleaned free of misplaced adhesive, shop marks and trademarks by the fabricator. Subsequent cleaning, removal of paint, dust, etc., shall be the responsibility of the Contractor.
 6. Plastic laminate all exposed surfaces including, but not limited to, interior of open cabinets and underside of upper cabinets.
 7. Pattern shall extend in one direction across the entire surface plane of items to receive patterned laminate.
 8. Edges of all cabinet doors and drawer fronts shall be laminated with 3 mm PVC in color selected to coordinate with plastic laminate applied to flat surfaces.
 9. Gluing: All gluing shall be done with a nationally recognized glue, in strict accordance with manufacturer's recommendations, using water-resistant glue equal to Urea-Formaldehyde resin glue for exterior for damp conditions. Type 1, waterproof glue shall be used for extreme conditions. Where widths or thicknesses are not available in hardwoods, gluing may be used on widths over 5-1/2", or thicknesses over 1/16".

2.02 STAIRWORK AND RAILS:

- A. Grade: Custom.
- B. Wood Species and Cut for Transparent Finish: Red oak, plain sawn.
- C. Wood Species for Opaque Finish: Any closed-grain hardwood, except that eastern white pine, sugar pine, or western white pine may be used for risers, stringers, and moldings.
- D. Finishes for Stair Parts: As follows:
 1. Treads: Transparent.
 2. Risers: Opaque.
 3. Stringers: Opaque.
 4. Balusters: Opaque.
 5. Handrails: Transparent.
 6. Scotia, Cove, and Other Moldings: Transparent.
 7. Cut carriages to accurately fit treads and risers. Glue treads to risers, and glue and nail treads and risers to carriages.
 8. Brackets: All-metal construction in a finish to match door hardware unless otherwise indicated on the drawings. Brackets shall be sized to meet accessibility codes and provide 2-1/4" clear between wall surface and inside of handrail.

2.03 WOOD CABINETS FOR TRANSPARENT FINISH:

- A. Grade: Custom.
- B. AWI Type of Cabinet Construction: Reveal overlay on face frame.
- C. Reveal Dimension: 1/2 inch (13 mm) or as indicated on drawings.
- D. Wood Species and Cut for Exposed Surfaces: Red oak, plain sawn or sliced.

- E. Retain one of three options in subparagraph below for Premium-grade cabinets, or delete all if selecting lower-quality grade or if grain matching is not required.
 - 1. Grain Direction: Vertically for drawer fronts, doors, and fixed panels..
 - 2. Matching of Veneer Leaves: Book match.
 - 3. Vertical Matching of Veneer Leaves: End match.
 - 4. Veneer Matching within Panel Face: Center-balance match.
 - 5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
 - 6. Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
 - F. Semi-exposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
 - G. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.
- 2.04 PLASTIC-LAMINATE CABINETS:
- A. Grade: Custom.
 - B. AWI Type of Cabinet Construction: Reveal overlay.
 - B. Reveal Dimension: 1/2 inch (13 mm) or as indicated on the drawings.
 - C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGL.
 - 2. Postformed Surfaces: Grade VGS.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: Grade HGS.
 - D. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade [VGS] [CLS].
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
 - E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
 - F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by laminate manufacturer's designations.

2.05 PLASTIC-LAMINATE COUNTERTOPS:

- A. Grade: Custom.
- B. High-Pressure Decorative Laminate Grade: HGS.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
- D. As indicated by manufacturer's designations.
- E. Grain Direction: Parallel to cabinet fronts.
- F. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- G. Core Material: High-Density Fiberboard: ANSI A208.1, Industrial Grade (45 lb/ft³ density), made with binder containing no urea formaldehyde.
 1. Tops in kitchens and toilets (subject to moisture) shall be constructed of Extria® treated composite wood panels as manufactured by CMI 500 W. Monroe St. Suite 2010, Chicago IL 60661 Phone: 866-382-8701
- G. Paper Backing: Provide paper backing on underside of countertop substrate.

2.06 HARDWARE:

- A. Base cabinet and wall hung cabinet Adjustable Shelf Supports: K-V #255 ZC recessed standards (2 per side) with #256R shelf supports with rubber cushions (4 per shelf).
- B. Wall mounted shelf standards shall be Knappe and Vogt 80ANO 60" long standards at 32" o.c. maximum unless otherwise noted.
- C. Brackets shall be Knappe and Vogt 180ANO length as required for shelf. Number as required to provide one at every shelf and standard connection.
- D. Drawer slides at all drawers except file drawers shall be Knappe and Vogt #1284 ¾ extension 100# rated slides. Drawer slides at file drawers shall be Knappe and Vogt #1429 full extension 100# rated slides.
- E. Pulls shall be Stanley #4484 in US 28 finish at all drawers and doors unless noted otherwise on the drawings.
- F. Latches shall be Stanley #CD42 aluminum or equal magnetic cabinet latches at all cabinet doors.
- G. Hinges shall be Stanley #1592 or equal or approved self-closing hinges (omit latches if self-closing hinges are used) at all cabinet doors.
- H. Locks shall be Stanley or equal. Locate where shown on the drawings.
- H. All clip angles shall be stainless steel.
- J. Provide any additional hardware as necessary for a complete installation.

2.07 MISCELLANEOUS MATERIALS:

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Rough Carriages for Stairs: No. 2 grade and any of the following species, kiln dried to 15 percent maximum moisture content:
 - 1. Douglas fir-larch.
 - 2. Douglas fir-south.
 - 3. Douglas fir-larch (north).
 - 4. Hem-fir.
 - 5. Hem-fir (north).
 - 6. Southern pine.
 - 7. Spruce-pine-fir (south).
 - 8. Spruce-pine-fir.
- D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- E. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- F. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Contact Adhesive: 250 g/L.
- G. Adhesive for Bonding Plastic Laminate: Contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.08 FABRICATION, GENERAL:

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
 - 1. Maximum moisture content for finish woodwork = 10% at time of fabrication.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members **3/4 Inch (19 mm)** Thick or Less: **1/16 inch (1.5 mm)**.
 - 2. Edges of Rails and Similar Members More Than **3/4 Inch (19 mm)** Thick: **1/8 inch (3 mm)**.
 - 3. Adjustable shelves shall be adjustable on 2" centers. Provide necessary hardware.
 - a. Width shall be 12" unless otherwise shown on the drawings.
 - b. Length shall be the wall length minus 2" unless otherwise indicated on the drawings.

4. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm).
- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
 2. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 3. Seal edges of openings in countertops with a coat of varnish.

2.09 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.
- D. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing architectural woodwork not indicated to be shop finished.
- E. Shop Priming: Shop apply the prime coat including backpriming, if any, for[transparent-finished] items specified to be field finished. Refer to Division 9 painting Sections for material and application requirements.
- F. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- G. Transparent Finish:
1. Grade: Custom
 2. AWI Finish System: Acrylic lacquer.
 3. Staining: Match approved sample for color.
 4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.

6. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
7. Sheen: Semigloss, 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

H. Opaque Finish:

1. Grade: Custom
2. AWI Finish System: Catalyzed lacquer.
3. Color: As indicated by manufacturer's designations.
4. Sheen: Semi-gloss, 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART III EXECUTION

3.01 PREPARATION:

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back-priming.

3.02 INSTALLATION:

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails[or finishing screws] for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than [36 inches (900 mm)] [60 inches (1500 mm)] [96 inches (2400 mm)] long, except where shorter single-length pieces are necessary.[Scarf running joints and stagger in adjacent and related members.]
 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- G. Stairs: Securely anchor carriages to supporting substrates. Install stairs with treads and risers no more than 1/8 inch (3 mm) from indicated position.
- H. Railings:

1. General: Install rails with no more than **1/8 inch in 96-inch (3 mm in 2400-mm)** variation from a straight line.
 2. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
 3. Wall Rails: Support rails on indicated metal brackets securely fastened to wall framing.
 - a. Space rail brackets not more than four feet o.c.
- I. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than **1/8 inch in 96-inch (3 mm in 2400-mm)** sag, bow, or other variation from a straight line.
 2. Maintain veneer sequence matching of cabinets with transparent finish.
 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than **16 inches (400 mm)** o.c. with No. 10 wafer-head screws sized for **1-inch (25-mm)** penetration into wood framing, blocking, or hanging strips
- J. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Install countertops with no more than **1/8 inch in 96-inch (3 mm in 2400-mm)** sag, bow, or other variation from a straight line.
 2. Secure backsplashes walls with adhesive.
 3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
- K. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- L. Refer to Division 9 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

End of Section

SECTION 06 65 10 - SOLID SURFACE FABRICATIONS

PART 1 — GENERAL

1.01 SUMMARY

- A. This Section includes the following horizontal and trim solid surface product types:

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 06 10 00	Rough Carpentry
Division 22	Plumbing

1.03 DEFINITION

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.04 SUBMITTALS

- A. Product data: For each type of product indicated, indicate product description, fabrication information and compliance with specified performance requirements.
- B. Shop drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
1. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
 2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.
- C. Samples: For each type of product indicated.
1. Submit minimum 6-inch by 6-inch sample in specified gloss.
 2. Cut sample and seam together for representation of inconspicuous seam.
 3. Indicate full range of color and pattern variation.
- D. Product certificates: For each type of product, signed by product manufacturer.
- E. NSF/ANSI standards: Refer to www.nsf.org for the latest compliance to NSF/ANSI Standard 51 for food zone — all food types.
- F. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Maintenance kit for finishes shall be submitted.

1.05 QUALITY ASSURANCE

- A. Utilize a shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
- B. Meet the standards of the following, as referenced herein:
1. American National Standards Institute (ANSI)

2. American Society for Testing and Materials (ASTM)
 3. National Electrical Manufacturers Association (NEMA)
 4. NSF International
- C. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Flame Spread Index: 25 or less.
 2. Smoke Developed Index: 450 or less.
- D. Coordination drawings shall be prepared indicating:
1. Project-specific information, drawn accurately to scale including indications of the following:
 - a. Plumbing work.
 - b. Electrical work.
 - c. Miscellaneous wood and/or steel for the general work.
 - d. Location of all walls, blocking locations and recessed wall items, etc.
 2. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
 3. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
- E. Provide coordination drawings as necessary for the benefit of fabricators/installers as an aid to coordination of work so as to eliminate conflicts that may arise during the installation of work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.07 WARRANTY

- A. Provide manufacturer's warranty against defects in materials.
 1. Warranty shall provide material and labor to repair or replace defective materials.
 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
 3. Warranty period: Ten years from date of substantial completion.
- B. Provide installer's warranty against defects in workmanship.
 1. Warranty shall provide material and labor to repair or replace defective materials.
 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
 3. Warranty period: Two years from date of substantial completion.

1.08 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:

1. Corian surfaces by DuPont
2. Solid Surfaces by Wilsonart
3. Meganite
4. Solid Surfacing by Formica

2.02 MATERIALS

- A. Solid polymer components shall be cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.

1. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.
2. Thickness: 1/2 inch
3. Edge treatment: As indicated on drawings
4. Backsplash: As indicated on drawings. If not indicated, use applied backsplash.
5. Sidesplash: As indicated on drawings. If not indicated, use applied sidesplash.

- B. Material shall meet or exceed the following performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5 x 10 ⁶ psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2 x 10 ⁶ psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale ASTM D 785
	56	Barcol Impressor ASTM D 2583
Thermal Expansion	3.02 x 10 ⁻⁵ in./in./°C (1.80 x 10 ⁻⁵ in./in./°F)	ASTM D 696
Gloss (60° Gardner)	5–75	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus & Bacteria Resist.	Does not support growth	ASTM G21&G22
Boiling Water Resist.	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resist.	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched)	0.28 ft.-lbs./in. of notch	ASTM D 256 Method A
Ball Impact Resist.: Sheets	No fracture—1/2 lb. ball: 1/4" slab—36" drop 1/2" slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	ΔE* ₉₄ <5 in 1,000 hrs.	ASTM G 155
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2") 0.8% (1/4")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol (LC50) Test
Flammability	Class I and Class A	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

2.03 ACCESSORIES

- A. Joint adhesive: Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant: Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.
- C. Conductive tape: Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.
- D. Insulating felt tape: Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.04 FACTORY FABRICATION

- A. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
- B. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - 1. Reinforce with strip of solid polymer material, 2" wide.
- C. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
- D. Rout and finish component edges with clean, sharp returns.
 - 1. Rout cutouts, radii and contours to template.
 - 2. Smooth edges.
 - 3. Repair or reject defective and inaccurate work.

2.05 FINISHES

- A. Color shall be as indicated in Finish Schedule or drawings. If not indicated, Architect shall select from manufacturer's full range.
- B. Finish: Provide surfaces with a uniform finish.
 - 1. Matte: gloss range of 5–20.

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
- B. Provide product in the largest pieces available.

- C. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
- D. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
- E. Cut and finish component edges with clean, sharp returns.
- F. Rout radii and contours to template.
- G. Anchor securely to base cabinets or other supports.
- H. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
- I. Carefully dress joints smooth, remove surface scratches and clean entire surface.
- J. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.
- K. Provide backsplashes and sidesplashes at all walls and adjacent millwork.
- L. Adhere backsplashes and sidesplashes to countertops using manufacturer's standard color-matched Joint Adhesive.
- M. If coved backsplashes or sidesplashes are specified, fabricate radius cove at intersection of counters with backsplashes to dimensions shown on the drawings.

3.03 REPAIR

- A. Repair or replace damaged work which cannot be repaired to architect's satisfaction.

3.04 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

End of Section

SECTION 07 13 26 – WATERPROOFING & DAMPPROOFING

PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials and equipment, and perform all work to install waterproofing and dampproofing as shown on the drawings and as specified herein.
- B. In general this section shall include the following:
 - 1. Install waterproofing membrane and protection course at all walls below grade prior to backfilling.
 - 2. Install mastic dampproofing on CMU walls behind brick veneer.
 - 3. The Concrete Contractor shall furnish and install moisture barrier under concrete slabs, and waterstops in foundation and floor slabs.
 - 4. The Masonry Contractor shall assist the Concrete Contractor with the installation of waterstops which bridge the intersection of concrete and masonry.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit manufacturer's specifications and installation instructions for waterproofing membrane, waterstops, and protection board.

1.04 PROJECT CONDITIONS:

- A Provide a suitable area for storage of dampproofing materials and equipment. Store asphalt emulsion containers on end on wood or other clean rigid pad, to prevent adherence of foreign material.
- B Any work or materials damaged during the handling and application of asphalt emulsion shall be restored to original condition or replaced at no additional cost to the Owner.

1.05 GUARANTEE:

- A All areas waterproofed are to be guaranteed during the one (1) year guarantee period. Any water leakage covered herein is to be repaired at the contractor's expense.

PART II PRODUCTS

2.01 MATERIALS:

- A Waterproofing of wall areas below grade and decks above finished space shall be Bituthene System 4000 Waterproofing System as manufactured by Grace Construction Products, Mel-Rol® Waterproofing System as manufactured by W. R. Meadows, Inc. or approved equal.
 - 1. Membrane shall be Bituthene 4000 Waterproof Membrane or approved equal.
 - a. Thickness 1/16 in. (1.5 mm) nominal ASTM D3767—method A
 - b. Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C) Unaffected ASTM D1970
 - c. Tensile strength, membrane, die C 325 lbs/in.2 min. ASTM D412 modified1

d.	Tensile strength, film 5,000 lbs/in.2 min.	ASTM D882 modified1
e.	Elongation, ultimate failure of rubberized asphalt 300% min.	ASTM D412 Modified
f.	Crack cycling at -25°F (-32°C), Unaffected 100 cycles	ASTM C836
g.	Lap adhesion at minimum application temperature: 5 lbs/in. (880 N/m)	ASTM D1876 modified2
h.	Peel strength: 9 lbs/in. (1576 N/m)	ASTM D903 modified3
i.	Puncture resistance, membrane: 50 lbs (222 N) minimum	ASTM E154
j.	Resistance to hydrostatic head 210 ft (70 m) of water	ASTM D5385
k.	Permeance 0.05 perms maximum method	ASTM E96, section 12—water
l.	Water absorption 0.1% maximum	ASTM D570

2. Surface treatment shall be Bituthene Surface Conditioner.

3. All waterproofing on walls below grade shall be protected by Bituthene Protection Board.

B Mastic dampproofing shall be asphalt emulsion type equal to Karnak 200 fibrated, manufactured by Karnak Chemical Corporation, Air-Shield™ LMP by W.R. Meadows, or Hydrocide 700 semi-mastic manufactured by Sonneborn Building Products, Division Contech, Inc.

PART III EXECUTION

2.02 SURFACE PREPARATION:

A Surfaces to receive waterproofing shall be clean, dry, and free of voids, loose aggregate scale, and sharp projections.

2.03 INSTALLATION OF WATERPROOFING ON WALLS:

A Place Z-strips at footings.

B At deck applications, adhere tape to wall to depth equivalent to the thickness of wearing slab.

C Install waterproofing sheets as recommended by manufacturer.

D Tape joints as recommended by manufacturer.

E Clean and prepare subsurfaces in accordance with waterproofing manufacturers requirements.

F Cover waterproofing on exterior walls with polystyrene on impaling pins.

2.04 INSTALLATION OF WATERSTOPS:

A Install in all walls below grade to bridge the gap between the wall and the slabs on grade.

B All splicing connections shall be made in accordance with manufacturers recommendations.

2.05 INSTALLATION OF DAMPPROOFING:

A Apply mastic dampproofing to exterior face of exterior masonry wall which are to receive brick veneer, in one full coat over the block.

B Fill all cracks, crevices, and pores of concrete. Make sure coating is continuous and free from breaks and pinholes.

C Dampen the dry concrete surfaces and keep surface damp ahead of application.

SECTION 07 21 00 – BUILDING INSULATION

PART I GENERAL

1.01 SCOPE:

- A. Furnish and install thermal insulation at all exterior cavity walls and batt insulation and insulation where noted on the drawings.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	04 20 00	Unit Masonry
Section	05 40 00	Cold Formed Metal Framing and Sheathing
Section	09 22 16	Metal Support Systems
Section	09 29 00	Gypsum Wallboard
Section	09 51 13	Acoustic Treatment

6.01 SUBMITALS

- A. Submit product data for all insulation products.

6.02 DELIVERY, STORAGE, AND HANDLING:

- A. Protect insulation materials from physical damage and from deterioration due to 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.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART II PRODUCTS

7.01 MATERIAL:

- A. Insulation for exterior metal stud walls shall be 6" (R-19) FSK faced fiberglass batt insulation ASTM C665 Type III, Class A with attachment flanges on paper backing. Insulation shall be sized for friction fit between studs.
- B. Batt insulation at roof trusses shall be 9-1/2 inch (R-30) unfaced fiberglass batt insulation ASTM C 665 Type II, Class A.
- C. Batt insulation not covered by gypsum wallboard, or other code-approved substrate, shall be foil-faced, fire-resistant batt insulation complying with ASTM C 665, Type III, Class A, Category 1. Surface burning characteristics: Maximum flame spread: 25; Maximum smoke developed: 50, when tested in accordance with ASTM E 84.
- D. Sound Attenuation insulation shall be 3-1/2 inch thick unfaced fiberglass acoustical insulation complying with ASTM C 665 Type I. Surface burning characteristics: Maximum flame spread:

10; Maximum smoke developed: 10, when tested in accordance with ASTM E 84. Combustion Characteristics: Passes ASTM E 136 test. Fire resistance rating: Passes ASTM E 119 test.

- E. Sound insulation above acoustic tile ceilings shall be 6-1/4" sonobat insulation (Unfaced fiberglass batt insulation ASTM C665 Type I provided in 24" wide rolls for installation above acoustical ceilings)
- F. Perimeter foundation insulation shall be 1-1/2" thick rigid closed-cell board complying with ASTM C-578 Type IV with the following properties:
1. Compressive Strength: 25 psi minimum
 2. Flexural Strength: 50lbs/in² min (ASTM C 203)
 3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 min. °F-ft²-h/Btu²/inch at 40°F and 75°F respectively (ASTM C 518).
 4. Water Absorption: max. 0.1% by volume (ASTM C 272).
 5. Water Vapor Permeance: 1.1 perm-inch max.
 6. Dimensional Stability: 2% max. linear change (ASTM D2126).
 7. Flame Spread: 5 (ASTM E 84).
 8. Smoke Developed: 45 to 165 (ASTM E84)
 9. Size: manufacturer's standard lengths and widths.
 10. Approved manufacturers include:
 - A. DiversiFoam Products.
 - B. Dow Chemical Company.
 - C. Owens Corning.
 - D. Pctiv, Building Products Division.
- G. Rigid insulation shall be of thickness indicated in drawings (minimum) AND provide R-Value if indicated in drawings (minimum). If rigid insulation is called for in the drawings, but no thickness or R-Value is indicated, thickness shall be selected by the Architect. Provide rigid closed-cell board complying with ASTM C-578 Type IV with the following properties in all location indicated on drawings:
1. In locations indicated for non-vertical installation (under slab, above roof deck, etc.)
 - a. Compressive Strength: 25 psi minimum
 - b. Flexural Strength: 50lbs/in 2 min (ASTM C 203)
 - c. Water Absorption: max. 0.1% by volume (ASTM C 272).
 2. In locations indicated for vertical installation (walls, etc.):
 - a. Compressive Strength: 15 psi minimum
 - b. Flexural Strength: 40lbs/in 2 min (ASTM C 203)
 - c. Water Absorption: max. 1.1% by volume (ASTM C 272).
 3. In all locations:
 - a. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 min. 0 F-ft 2 -h/Btu 2 /inch at 40 0 F and 75 0 F respectively (ASTM C 518).
 - b. Water Vapor Permeance: 1.1 perm-inch max.
 - c. Dimensional Stability: 2% max. linear change (ASTM D2126).
 - d. Flame Spread: 5 (ASTM E 84).
 - e. Smoke Developed: 45 to 165 (ASTM E84)
 - f. Size: Lengths and widths as required by project conditions and dimensions.
 4. Approved manufacturers include:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Pactiv, Building Products Division.

- e. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements.

PART III EXECUTION

9.01 GENERAL:

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.
- B. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- C. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice or snow.
- D. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

9.02 INSTALLATION OF BATT INSULATION:

- A. Install sound insulation in walls around rooms and above ceilings as shown on the drawings. Whether or not shown in drawings, install sound insulation in walls around, and above ceilings in, ALL restrooms, offices indicated for three or fewer occupants, conference/meeting rooms, mechanical rooms and any room with a computer server, voltage transformer or dimming rack.
- B. Set vapor-retarder faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
- C. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill the cavity, provide lengths that will produce a snug fit between studs.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. For wood framed construction with faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce air tight installation after concealing finish is in place.
 - 4. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces not large enough to receive batts. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

9.03 INSTALLATION OF RIGID INSULATION AT FURRED MASONRY WALLS:

- A. Install wall insulation as follows:
 - 1. Install insulation boards vertically against backup wythe of masonry. Wedge insulation boards tightly between rows of metal furring stripes.

2. Cut insulation by means of saw, knife, or similar sharp tool to fit around obstructions across the cavity such as vents, louvers, pipe, and conduit. Cut insulation to 8" widths and bevel edges to seal tightly at radius corners.
3. Coordinate the installation of insulation with the masonry work. Be sure the dampproofing or waterproofing is in place on face of backup before insulation is installed.

9.04 CLEAN UP:

- A. Remove all debris and unused insulation products from the site.

9.05 PROTECTION:

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

End of Section

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Commercial weather barrier assemblies.
 - 2. Flexible flashing.
 - 3. Weather barrier flashing.
 - 4. Weather barrier accessories.
 - 5. Drainage material.
- B. Related Requirements:
 - 1. Section 05 40 00 "Cold Formed Metal Framing and Sheathing" for installation of exterior wall framing system.
 - 2. Section 06 10 00 "Rough Carpentry" for installation of wall blocking.
 - 3. Section 07 21 00 "Building Insulation" for installation of batts and rigid insulation board.
 - 4. Section 07 42 13 "Prefinished Metal Panel Siding" for installation metal wall panels.
 - 5. Section 07 42 43 "Fiber-Cement Siding" for installation of fiber-cement board siding.
 - 6. Section 07 62 00 "Flashing and Sheet Metal" for installation of thru wall flashings.

1.3 DEFINITIONS

- A. Weather Barrier: A combination of materials and accessories that do the following:
 - 1. Prevents the accumulation of water as a water-resistive barrier.
 - 2. Minimizes the air leakage into or out of the building envelope as a continuous air barrier.
 - 3. Provides sufficient water vapor transmission to enable drying as a vapor-permeable membrane.
- B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly per International Building Code Section 1403.2.
- C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 section 5.4.3.1.
- D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).
- E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of **10 perms** (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method

using Procedure A of ASTM E 96 per definition in International Building Code. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.
- B. Sustainable Design Submittals:
 - 1. Test Reports: Envelope testing and verification of the following:
 - a. Water-Spray Test.
 - b. Air Infiltration Test.
 - c. Water Penetration Test.
 - 2. Product Data: Including the following information:
 - a. Provide Health Product Declarations (HPDs) or list of weather barrier ingredients by name and Chemical Abstract Service (CAS) registry number or Proprietary Ingredients hazards associated with LT-1/LT-P1 down to 0.1 percent (1000 ppm).
 - b. Provide Environmental Product Declarations (EPD's)
 - c. Provide SDS (formerly MSDS), third-party certifications, or product technical data confirming that systems meet or exceed emissions guidelines for volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), as follows:
 - 1) Commercial weather barrier complies with California Department of Public Health (CDPH) Standard.
 - 2) Adhesives and sealants wet-applied onsite are to meet/exceed VOC content requirements for wet-applied products and comply with SCAQMD Rule 1168.
 - 3) Flashing systems comply with SCAQMD Rule 1168 on VOC limits.
- C. Shop Drawings: Show details of weather barrier at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For **weather barrier membrane and flexible flashing**, from ICC-ES.
- B. Manufacturer's Instructions: For installation of each product specified.
- C. Sample Warranty: For manufacturer's warranty.
- D. Reports: Field test and inspection reports.
- E. Installer's weather barrier manufacturer-training certificate.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build integrated mockups of exterior wall assembly [**as shown on Drawings**] [**150 sq. ft. (14 sq. m)**] **<Insert area or dimensions>**, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of weather barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Include junction with roofing membrane [**building corner condition,**] [**and**] [**foundation wall intersection**] [**fenestration and wall interface**].
 - b. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply weather barrier until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Manufacturer's Field Service: Register project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project registration and observation process.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store near heat source or open flame.

1.8 WARRANTY

- A. Manufacturer's Product Warranty: To repair or replace weather barrier product that fails in materials within specified warranty period.
 - 1. Warranty Period: 10 years from date of purchase.
- B. Manufacturer's Product and Labor Warranty: Manufacturer agrees to repair or replace weather barrier that fails in materials within specified warranty period, including removal and replacement of affected construction up to manufacturer's limits.
 - 1. Warranty Period: 10 years from date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain weather barrier assembly components, including **weather barrier flashing** from **same manufacturer as weather barrier**.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.
- B. High-Performance Installations:
 - 1. For installation with one of the following building envelope performance or structural characteristics:
 - a. Exceeding **65 mph (100 km/h)** equivalent structural load.
 - b. Exceeding **15 mph (24 km/h)** equivalent wind-driven rainwater infiltration.
 - c. Construction with gypsum or cement-based exterior sheathing.
 - d. Non-wood based primary structure such as: steel, light gage steel, masonry or concrete.

2.3 WEATHER BARRIER

- A. Commercial Building Wrap: ASTM E 2357 passed, ABAA (Air Barrier Association of America) evaluated air barrier assembly, and assembly water resistance per ASTM E 331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E 84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; **Tyvek® CommercialWrap®** or a comparable product by one of the following:
 - a. **<Insert manufacturer's name>**.
 - 2. System Description, Single-Layer Weather Barrier: Single-layer weather barrier, including flashing and sealing of penetrations and seams.
 - 3. Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.
 - 4. Air Permeance, Product: Not more than **0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.005 L/s x sq. m at 75 Pa)** when tested in accordance with ASTM E 2178.
 - 5. Air Permeance, Assembly: Not more than **0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 PA)** when tested in accordance with ASTM E 2357 and evaluated by ABAA.
 - 6. Water Penetration Resistance, Product: Hydrostatic head resistance greater than **7.7 feet (2.35 m)** in accordance with AATTC 127.

7. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E 2357 to water resistance in accordance with ASTM E 331 to [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)] [10.4 lbf/sq. ft. (500 Pa)] [12.5 lbf/sq. ft. (575 Pa)].
8. Water-Vapor Permeance: Not less than 23 perms (1300 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A) or not less than 28 perms (1600 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Water Method (Procedure B).
9. Water-Vapor Permeance: Not less than 30 perms (1700 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A) or not less than 46 perms (2600 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Water Method (Procedure B).
10. Allowable UV Exposure Time: Not less than nine months when tested in accordance with ASTM G 155 (Accelerated Weathering).
11. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.
12. Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
 - a. Peak Heat Release: 13,217 Btu/sq. ft. (150 kW/sq. m).
 - b. Total Heat Release: 1762 Btu/sq. ft. (20 MJ/sq. m)
 - c. Effective Heat of Combustion: 7744 Btu/lb (18 MJ/kg)
13. Weather barrier system to have a VOC content of 30 g/L or less.

2.4 WEATHER BARRIER FLASHING

- A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; FlexWrap™ NF or comparable product by one of the following:
 - a. An equal product by an approved manufacturer.
 2. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
 3. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
 4. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (minus 4 deg C) as Class A (without primer use).
 5. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- B. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; [StraightFlash™] [StraightFlash™ VF] or comparable product by one of the following:
 - a. An equal product by an approved manufacturer.

2. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
3. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (minus 4 deg C) as Class A without primer use.
4. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

2.5 WEATHER BARRIER ACCESSORIES

- A. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.
 1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Tape.
- B. Closed-Cell Polyurethane Foam Insulation: Low pressure, low expansion, single component polyurethane foam, with maximum flame-spread and smoke-developed indexes of 15 and 25, respectively, per ASTM E 84.
 1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; DuPont™ Window & Door Foam.
 2. Pressure Build-Up: 0.0247 psi (0.170 kPa) maximum, AAMA 812.
 3. Deflection: 0.0050 inch (0.127 mm) maximum, AAMA 812.
- C. Fasteners with Self-Gasketing Washers: Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with [1-inch- (25-mm-)] [2-inch- (50-mm-)] diameter, high-density polyethylene cap washers with UV inhibitors.
 1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Wrap Caps.
- D. Primer for Flashings: Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.
 1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; DuPont™ Adhesive Primer.
 2. Peel Adhesion Test: Passes in accordance with ASTM D 3330, Test Method F, for the following.
 - a. Peel Angles: 0, 25, 72, and 180 degrees.
 - b. Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
 3. Chemical Compatibility: Pass; AAMA 713.
 4. Flame Spread Index: 5; ASTM E 84.
 5. Smoke Development Index: 0; ASTM E 84.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
 - 1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
 - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 COMMERCIAL BUILDING WRAP INSTALLATION

- A. General: Comply with weather barrier manufacturer's written instructions and warranty requirements.
- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed.
 - 1. Maintain continuity of air and water barrier assemblies.
 - 2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
 - 3. Install weather barrier horizontally starting at lower portion of wall surface.
 - 4. Provide minimum 6 inches (150 mm) overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.
- C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.
 - 1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
- D. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer's installation guidelines.
 - 1. Do not use temporary fasteners to permanently attach weather barrier.

2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
 3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
- E. Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings according to weather barrier manufacturer's installation guidelines.
1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
 2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
 3. Install flashing according to weather barrier manufacturer's installation guidelines.

3.4 WEATHER BARRIER FLASHING INSTALLATION

- A. Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
1. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
 2. Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
 3. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
 4. Lap weather barrier flashing a minimum of **2 inches (50 mm)** onto weather barrier.
 5. Apply pressure over entire surface using roller or firm hand pressure
- B. Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
1. Apply [**6-inch- (150-mm-)**] [**9-inch- (230-mm-)**] wide conformable weather barrier flashing at door and window sills.
 2. Ensure that sill flashing does not slope to the interior.
 3. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
 4. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
 5. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
 6. Use strip flashing with wrap cap screws to secure head flap of the windows.
- C. Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.
1. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.

- D. Terminations: Provide minimum **2 inches (50 mm)** overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.
 - 1. Secure weather barrier with fasteners and weather-barrier flashing.

3.5 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material with grooves or channels running vertically in compliance with manufacturer's written instructions.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to train installers and observe subject test-wall areas and installations.
- B. Testing Agency: **[Owner will engage]** **[Engage]** a qualified third-party testing agency to perform tests and inspections.
- C. Test Area: Perform tests on **[one bay at least 30 feet (9.15 m), by one story]** **[representative areas of structural-sealant-glazed curtain walls]** **[mockups]** **<Insert requirements>**.
- D. Field Quality Control Testing: Perform the following test on **[representative areas of structural-sealant-glazed curtain walls]** **[mockups]** **<Insert requirements>**.
 - 1. Air Infiltration Whole Building: ASTM E 779 at not more than **[0.40 cfm/sf (2.00 L/s per sq. m)]** **[0.25 cfm/sf (1.25 L/s per sq. m)]** **[0.15 cfm/sf (0.75 L/s per sq. m)]** at **1.57 lb/sq. ft. (75 Pa)**.
 - 2. Water Penetration: ASTM E 1105 at a minimum **[uniform]** **[and]** **[cyclic]** static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" article, but not less than **[2.86 lbf/sq. ft. (137 Pa)]** **[6.24 lbf/sq. ft. (300 Pa)]** **[10.0 lbf/sq. ft. (500 Pa)]** **[12.5 lbf/sq. ft. (600 Pa)]**. No water penetration shall occur as defined in ASTM E 1105.
 - a. Perform a minimum of **[two]** **[three]** **<Insert number>** tests in areas as directed by Architect.
 - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to **[10, 30, and 70 percent completion]** **<Insert requirements>**.
- E. Prepare test and inspection reports.

3.7 CLEANING

- A. Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of the authority having jurisdiction.

3.8 PROTECTION

- A. Protect installed weather barrier from the following:

1. Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).
2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
4. UV exposure in excess of products' stated limits.

END OF SECTION

SECTION 07 41 13 – METAL STANDING SEAM ROOFING

PART I - GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials and equipment, and perform all work to install metal standing seam roofing as shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 07 60 00 Flashing and Sheet Metal

1.03 SUBMITTALS:

- A. Submit manufacturer's data, installation instructions, and 6" square samples of specified materials to the Architect for approval.
- B. Submit complete shop drawings showing expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.
- C. Submit results indicating compliance with minimum requirements of the specified performance tests and results.
- D. Submit calculations with registered engineer seal, verifying roof panel and attachment method resists wind pressures imposed on it pursuant to applicable building codes.

1.04 WARRANTY:

- A. Provide manufacturer's standard twenty (20) year limited warranty on prefinished metal coatings.
- B. Roofing shall be guaranteed to be weather-tight for a minimum of two (2) years. Any leakage during the two year warranty period shall be repaired and paid for the Contractor.

PART II - PRODUCTS

2.01 STANDING SEAM ROOFING:

- A. Approved Systems and Manufacturers:

1. "Tee-Panel" as manufactured by Berridge
2. "UC-14 Snap On" system as manufactured by Firestone Metal Products, Una-Clad
3. "Snap-On Standing Seam" as manufactured by Peterson Aluminum, PAC-CLAD
4. "Snap On Seam High Profile" as manufactured by Fabral
5. Additional systems and manufacturers must be approved by Architect prior to bidding.

- B. Panel: Nominal 12" wide G-90, Grade C, ASTM A-653-94 & ASTM A-924-94, hot dipped galvanized steel panel, ASTM-A446-85, with minimum 1 inch high standing seam.

1. Material Thickness: 24 gauge.
2. Color: Kynar 500 (0.80 to 0.90 mil dry film thickness) "Color as selected by the Architect to match Metal Building Fascia Panels". Total dry film coating thickness with primer to be 1.0 to 1.25 mils. Provide strippable protective film. Provide reverse side backer coating with 0.25 mil dry film thickness.
3. Length: Manufacturers standard 40 ft. or less in one continuous length.

- C. Fabrication: Fabricate panels, trim and accessories to allow controlled expansion in running lengths in relation to system components, adjoining materials, flashing and wall construction.
- D. Performance:
 - 1. Air Infiltration ASTM E 283-84
 - 2. Water Infiltration ASTM E 331-86

2.02 TRIM AND ACCESSORIES

- A. General:
 - 1. Metal flashings and trim shall be from the same manufacturer and of the same material and gauge as panels. Exposed components shall be formed in longest possible lengths. Color to match panels.
 - 2. Manufacturer's standard fasteners, brackets, clips, furring strips, spacers, flashings, closures, weather –stripping, joint sealers, sealants, expansion control, etc. as required for complete weather-tight installation.
 - 3. Anchorage: Provided by the manufacturer. Comply with manufacturer's instructions.

2.03 MISCELLANEOUS MATERIALS:

- A. Bituminous Coating: Cold applied asphaltic, complying with FS TT-C-494, Type II, 12 mils min. dry film thickness.
- B. Underlayment: 30 lb. Unperforated, organic asphalt saturated roofing felt, complying with ASTM D-226, 36" wide.
- C. Paper Slip Sheet: 5-lb. Rosin sized building paper.

2.04 SHOP FABRICATED UNITS:

- A. Expansion Provisions: Where lapped or bayonet-type provisions cannot be used, form expansion joints of intermeshing hooked flanges not less than 1 inch deep, filled with mastic sealant.
- B. Sealant Joints: Where movable, non-expansion joints are indicated, for m metal to provide for proper installation of electrometric sealant in compliance with SMACNA standards.

PART III - EXECUTION

3.01 INSTALLATION:

- A. System shall be installed straight and true to line, in compliance with manufacturer's instructions.
- B. Panel system shall not come in contact with dissimilar materials which will cause harmful reactions between the metals and/or finish.
- C. Separate dissimilar metals with coat of bituminous paint, concealed on one or both sides.
- D. Install underlayment and slip sheet on solid substrate.
- E. Panels shall be fully interlocked with its adjacent panel.
- F. Fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, flashings, etc. to allow drainage. Seal joints as required. Provide leak-proof construction.
- G. Sealant Joints: Embed hooked flanges not less than 1 inch into sealant. Completely conceal sealant.

- H. Install system to prevent bending buckling, twisting, abrasion, scratching, denting, etc. Only minor scratches may be touched-up in field.
- I. Anchor components securely in place. Use fasteners recommended by panel manufacturer. Accommodate thermal and structural movement. Use gasketed fasteners to prevent electrolytic action between metals. Conceal all fasteners and anchors.

3.02 CLEANING:

- A. Remove protective film upon completion without damaging finish.
- B. Completed system shall be clean and free from grease, stains and finger marks.

3.03 PROTECTION:

- A. Protect work to be free from damage at time of Owner's acceptance and completion of entire project.

End of Section

SECTION 07 42 13 – PREFINISHED METAL PANEL SIDING

1PART I GENERAL

1.01 SCOPE:

- A Provide all labor, materials, equipment and supervision necessary to furnish and install vertical metal siding where shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit manufacturer's data for panels accessories and fasteners proposed to be used.

1.04 GUARANTEE:

- A Provide manufacturer's standard 20 year finish guarantee.

2PART II PRODUCTS

2.01 MANUFACTURER:

- A. Acceptable manufacturers include:

1. MBCI Metal Wall and Roof Systems
2. Industrial Building Panels Inc.
3. Fabral
4. Reynolds Metals Co.
5. Metl-Span
6. Kingspan Group
7. Centria Architectural Systems
8. Firestone Building Products
9. Additional manufacturers must be approved by Architect prior to bidding.

2.02 MATERIALS:

- A Prefinished metal panel siding shall be 38-1/4 inch wide 24 gauge "R" panel for 36 inch coverage.
- B Finish shall be equal to signature 300 70% polyvinylidene Fluoride resin by MBCI. Color shall be selected by the Architect from the full range of manufacturer's standard colors
- C Allowable Uniform Live Loads in Pounds Per Square Foot:

<u>Span Type</u>	<u>Load Type</u>	<u>Span in Feet</u>
2 Span	Positive Wind Load	86
	Live Load Deflection	68
3 or more	Positive Wind Load	108
	Live Load Deflection	85

- C. Provide all preformed accessories, closure panels, clips, corners and fasteners etc. necessary to produce a complete installation.

3PART III EXECUTION

3.01 INSTALLATION:

- A Install metal panel siding in accordance with the drawings and with the manufacturer's printed instructions.

End of Section

SECTION 07 42 43 – COMPOSITE WALL PANELS

1PART I GENERAL

1.01 SCOPE:

- A Provide all labor, materials, equipment and supervision necessary to furnish and install an exterior drained and back ventilated rainscreen where shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 05 40 00 – Cold Formed Metal Framing and Sheathing

Section 06 10 00 – Rough Carpentry

Section 07 21 00 – Building Insulation

Section 07 xx xx – Weather Barriers

Section 07 62 00 – Flashing and Sheet Metal

Section 07 92 00 – sealants and Caulking

1.03 SUBMITTALS:

- A Submit manufacturer's data for panels accessories and fasteners proposed to be used.
- B Manufacturer's Details: Submit drawings, including plans, sections, showing installation details that demonstrate product dimensions, edge/termination conditions/treatments, compression and control joints, corners, openings and penetrations.
- C Samples: Submit samples of each product type proposed for use.

1.04 GUARANTEE:

- A Provide manufacturer's standard 15 year warranty against manufactured defects in fiber cement panels.

2PART II PRODUCTS

2.01 MANUFACTURER:

- A. Acceptable manufacturers include:
 - 1. Nichiha Corporation: Vintagewood series – color: cedar or as selected by Owner.
 - 2. Additional manufacturers must be approved by Architect prior to bidding.

2.02 MATERIALS:

- A Fiber Cement panels manufacture from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects and wood fiber bundles.
- B Panel surface pre-finished and machine applied.

- C AWP-3030 profiled along all four edges, such that both horizontal and vertical joints between the installed panels are ship-lapped.
- D. Factory-applied sealant gasket added to top and right panel edges; all AWP-3030 joints contain a factory sealant.

3PART III EXECUTION

3.01 INSTALLATION:

- A Install fiber cement siding in accordance with the drawings and with the manufacturer's printed instructions.

End of Section

SECTION 07 54 55 – MECHANICALLY FASTENED THERMOPLASTIC MEMBRANE ROOFING

1 PART I GENERAL

1.01 SCOPE:

- A. Furnish and install a mechanically fastened thermoplastic membrane roofing system where shown on the drawings, including insulation, wood grounds, and wood cleats required to secure roofing in place and miscellaneous items as necessary for a complete warranted installation.
- B. Any contractor who intends to submit a bid using a roofing system other than the specified manufacturer must submit for pre-qualification in writing fourteen (14) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection. Bids stating "as per plans and specs" will be unacceptable.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	05 31 00	Steel Roof Deck
Section	06 10 00	Rough Carpentry
Section	07 62 00	Flashing and Sheet Metal
Section	07 72 00	Roofing Accessories

1.03 DEFINITIONS:

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.04 PERFORMANCE REQUIREMENTS:

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

- 1. Fire/Windstorm Classification: Class 1A-105
- 2. Hail Resistance: MH

1.05 SUBMITTALS:

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include layout, details of construction and identification of materials.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Insulation fastening patterns.

- C. Samples for Verification: For the following products:
1. 12-by-12-inch (300-by-300-mm) square of sheet roofing, of color specified, including side and end lap seam.
 2. 12-by-12-inch (300-by-300-mm) square of roof insulation.
 3. 12-by-12-inch (300-by-300-mm) square of walkway pads or rolls.
 4. 12-inch (300-mm) length of metal termination bars.
 5. 12-inch (300-mm) length of battens.
 6. Six insulation fasteners of each type, length, and finish.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system and lists formen who have received training from the manufacturer along with the dates training was received.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
1. Submit evidence of meeting performance requirements.
- F. Certification from the membrane manufacturer indicating the fasteners are capable of providing a static back-out resistance of 10 pounds minimum
- G. Certification from the membrane manufacturer indicating the membrane thickness over the reinforcing scrim (top ply membrane thickness) is nominal .015" (15 mil).
- H. Qualification Data: For Installer and manufacturer.
- I. Maintenance Data: For roofing system to include in maintenance manuals.
- J. Warranties: Provide sample copies of standard and special warranties specified in this Section.
- K. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.
- L. Certification of Manufacturer's warranty reserve.

1.06 QUALITY ASSURANCE:

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing for membrane roofing system identical to that used for this Project.
- C. Source Limitations: Obtain components for membrane roofing system from or approved by roofing membrane manufacturer.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
1. Exterior Fire-Test Exposure: Class A ASTM E 108, for application and roof slopes indicated.

2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.
 - F. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.
 - G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy two (72) hours prior to the manufacturer's final inspection.
 - H. Pre-installation Conference: Contractor must have approved shop drawings prior to scheduling pre-installation conference. Conduct conference at Project site. Notify attendees not less than 10 days prior to scheduled meeting date. Review methods and procedures related to roofing system including, but not limited to, the following:
 1. Meet with Owner, Architect, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 2. Introduce Contractor's proposed foreman and provide contact information. Once the work begins, Contractor shall not change foreman during the course of the work. Foreman shall be on the job site at all times while work is in progress.
 3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 6. Review structural loading limitations of roof deck during and after roofing.
 7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 8. Review governing regulations and requirements for manufacturer's certificates if applicable.
 9. Review temporary protection requirements for roofing system during and after installation.
 10. Review roof observation and repair procedures after roofing installation.

1.07 USE OF THE PREMESIS:

- A. Before beginning work, the roofing contractor must secure approval from the building owner's representative for the following:
 1. Areas permitted for personnel parking.
 2. Access to site.
 3. Areas permitted for storage of materials and debris.
 4. Areas permitted for location of cranes, hoists and chutes for loading and unloading materials to and from the roof.

1.08 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components. Deliver in sufficient quantity to permit work to continue without interruption.
- B. Store membrane in the original undisturbed plastic wrap in a cool, shaded area and cover with light – colored, breathable, waterproof tarpaulins. Membrane that has been exposed to the elements for approximately 7 days must be prepared with Carlisle Weathered Membrane Cleaner prior to hot air welding.
- C. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. If exposed to lower temperature, restore to manufacturer's recommended application temperature before using. Protect stored liquid material from direct sunlight.
 - 1. Legally dispose of liquid material that cannot be applied within its stated shelf life.
- D. Store curable materials (adhesives and sealants) between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.
- E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- F. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.09 PROJECT CONDITIONS:

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements. Do not exceed temperature limitations recommended by roofing manufacturer.
- B. Proceed with work so new roofing materials are not subject to construction traffic to the greatest extent possible. When necessary, protect new roof sections and inspect for damage upon completion.
- C. Provide protection, such as ¾" plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
- D. New roofing shall be complete and weathertight at the end of each work day.
- E. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- F. Temporary Utilities:
 - 1. Water, power for construction purposes and lighting are available at the site and will be available to the roofing contractor.
 - 2. Provide all hoses, valves and connections for water from source designated by the Contractor when made available.
 - 3. Electrical power should be extended as required from the source. Provide all trailers, connections and fused disconnects

- G. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage, and application of materials.
- H. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- I. Contaminants such as grease, fats, and oils shall not be allowed to come in direct contact with the roofing membrane.

1.10 JOBSITE PROTECTION:

- A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The Contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.
- B. Do not overload any portion of the building, either by use of or placement of equipment, storage of debris, or storage of materials.
- C. Protect against flame spread. Maintain proper and adequate fire extinguishers.
- D. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains if required. At completion, test drains to ensure the system is free running and drains are water-tight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.

1.11 SAFETY:

- A. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the other personnel on the job site.

1.12 WORKMANSHIP

- A. Applicators installing new roof, flashing, sheet metal, and related work shall be factory trained and approved by the manufacturer they are representing.
- B. All work shall be of the highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.
- C. Contractor's selected foreman shall be on the job site at all times while work is in progress.
- D. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified including operation of hot air welding equipment and power supply.
- E. There shall be no deviations made from this specification or the approved shop drawings without the prior approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.

1.13 WARRANTY:

- A. Special Warranty: Manufacturer's, total system warranty covering both labor and material without monetary limitation, in which manufacturer agrees to repair or replace components of membrane

roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks. The maximum wind speed coverage shall be peak gusts of 90 mph measured at 10 meters above ground level. Certification is required with Bid Submittal that Manufacturer has reviewed and agreed to such coverage.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories roof insulation fasteners cover boards walkway products and other components of membrane roofing system.
 2. Warranty Period: Twenty (20) years from date of Substantial Completion.
- B. Pro-rated System Warranties shall not be accepted.
- C. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART II PRODUCTS

2.01' GENERAL

- A. All components of the specified roofing system shall be products of Carlisle SynTec Incorporated or accepted by Carlisle as compatible.
- B. All products (including insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the warranty.

2.02 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE

- A. Furnish Sure-Weld .060" thick, white reinforced TPO (Thermoplastic Polyolefin) membrane as needed to complete the roofing system.

2.03 AUXILIARY MATERIALS:

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, **55 mils (1.4 mm)** thick, minimum, of same color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard solvent based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
- D. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- E. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch (25 mm) wide by 0.05 inch (1.3 mm) thick, prepunched.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

2.04 ROOF INSULATION:

- A. When applicable, insulation shall be installed in multiple layers. The first and second layer of insulation shall be mechanically fastened to the substrate in accordance with the manufacturer's published specifications.
- B. Insulation shall be Carlisle polyisocyanurate as supplied by Carlisle. Minimum R-value required shall be as indicated on the drawings. If not indicated, Provide aged R-25 minimum.
- C. Insulation Overlay Board- ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch thick factory primed.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Georgia-Pacific Corporation; Dens Deck Prime.
 - b. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements.

2.05 ADHESIVES AND CLEANERS:

- A. Bonding Adhesive: Sure Weld
- B. Edge Sealant: Cut Edge Sealant.
- C. Sealer: Water Cut-Off Mastic and PT 304 Sealant.
- D. Pocket Sealant: TPO Molded Pocket Sealant.
- E. Cleaner: Carlisle Weathered Membrane Cleaner.

2.06 FASTENERS AND PLATES:

- A. HP-X Fasteners: A heavy duty #15 threaded fastener with a Phillips head used for the membrane securement into steel, wood plank or minimum 15/32 inch thick plywood.
- B. HP-Xtra Fasteners: An oversized diameter (.315") steel threaded fastener used in conjunction with Piranha Xtra Plates for membrane securement into steel or wood decks.
- C. HP Fasteners: A threaded, black epoxy electro-deposition coated fastener used with steel and wood roof decks for insulation attachment only.
- D. Pre-Assembled ASAP Fasteners: A pre-assembled 3" diameter Plastic Plate and standard Phillips head fastener used for insulation attachment only into steel or wood decks. Installed using Olympic Fastening Tools.
- E. InsulFast Fasteners: A threaded #12 fastener with #3 Phillips head used for insulation attachment only into steel or wood decks.
- F. HP Term Bar Nail-Ins: A 1-1/4" long expansion anchor with a zinc plated steel drive pin used for fastening the Carlisle Termination Bar or Seam Fastening Plates to concrete, brick, or block walls.
- G. Piranha Plates: A 2-3/8 inch diameter metal barbed fastening plate used with Carlisle Fasteners for membrane securement. This plate can be used for insulation securement.
- H. Piranha Xtra Plates: A 2-3/8 inch diameter metal barbed fastening plate with an oversized hole for use with Carlisle HP-Xtra Fasteners for membrane securement. This plate can be used for insu-

lation securement.

- I. Insulation Fastening Plates: a nominal 3 inch diameter metal plate used for insulation attachment with the appropriate Carlisle Fastener.

2.07 WALKWAYS:

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

2.06 METAL EDGING AND MEMBRANE TERMINATIONS:

- A. Sure-Weld Coated Metal: 4'x 10' coated metal sheets made from 24 gauge galvanized steel with a minimum .035" thick non-reinforced white Sure-Weld laminate. Sure-Weld membrane can be welded directly to the Sure-Weld Coated Metal in accordance with the manufacturer's detail.

PART III EXECUTION

3.01 GENERAL:

- A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.

3.02 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 3. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 4. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 5. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 5 Section "Steel Deck."
 - 6. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 PREPARATION:

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 INSULATION INSTALLATION:

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.

- C. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches (50 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation. Stagger joints horizontally and vertically if multiple layers of insulation are installed.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- F. Install and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Install subsequent layers of insulation in a cold fluid-applied adhesive.

3.05 MEMBRANE PLACEMENT AND ATTACHMENT:

- A. Unroll and position membrane without stretching. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
- B. Secure the membrane with the required Carlisle Fasteners and Plates spaced a maximum of 12 inches on center depending on project conditions (centered over the pre-printed marks approximately 1-1/2 inches from the edge of the membrane sheet).
- C. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's specifications.

3.06 MEMBRANE SPLICING/HOT AIR WELDING PROCEDURES:

- A. Hot air weld the Sure-Weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications. At all splice intersections, roll the seam with a silicone roller prior to membrane seam cooling.
- B. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
- C. Repair all seam deficiencies the same day they are discovered.
- D. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete.

3.05 FLASHING:

- A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld reinforced membrane. Sure-Weld non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, scuppers, as well as inside and outside corners when the use of pre-fabricated accessories is not feasible.
- B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.06 WALKWAYS:

- A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing in accordance with the manufacturer's specifications.

3.07 DAILY SEAL:

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.08 CLEAN UP:

- A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

End of Section

SECTION 07 62 00 – FLASHING AND SHEET METAL

PART I GENERAL

1.01 SCOPE:

- A. Provide all labor, equipment, and materials to fabricate and install all sheet metal indicated on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1 General Requirements, apply to the work under this section.

Section 04 20 00 Unit Masonry
Section 06 10 00 Carpentry Section
Section 07 72 00 Roof Accessories
Section 07 92 00 Sealants and Caulking

1.03 REFERENCES:

- A. American Society for Testing and Materials (ASTM)
 - 1. A653-00 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.
 - 2. A792-99 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
 - 3. B209-00 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. B221-00 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- B. Warnock Hersey International, Inc., Middleton, WI (WH)
- C. Factory Mutual Research Corporation (FMRC)
- D. Underwriters Laboratories (UL)
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - 1. 2012 Edition Architectural Sheet Metal Manual, 7 h edition
- F. National Roofing Contractors Association (NRCA)
 - 1. Roofing and Waterproofing Manual, 5 th Edition

1.04 SUBMITTALS:

- A. Submit under provisions of Section 013300 - Submittals.
- B. Product Data
- C. Provide manufacturer's specification data sheets for each product in accordance with Section 013300.
- D. Metal material characteristics and installation recommendations.

- E. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specified can be approved. 160526Job# 07 62 00.2
- F. Provide approval letters from metal manufacturer for use of their metal within this particular roofing system type.
- G. Submit two (2) samples, illustrating typical metal edge, coping, gutters, fascia extenders for material and finish.
- H. Provide 6" square sample of specified sheet materials for Architect approval.
- I. Shop Drawings
1. For manufactured and shop fabricated gravel stops, fascia, scuppers, and all other sheet metal fabrications.
 2. Shop drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashing, termination's, and installation details.
 2. Indicate type, gauge and finish of metal.
- J. Certification
1. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.
 3. Submit roof manufacturer's certification that metal furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.05 QUALITY ASSURANCE:

- A. Engage an experienced roofing contractor specializing in sheet metal flashing work with a minimum of five (5) years experience.
- B. Successful contractor is required to maintain a full-time supervisor/foreman who is on the job-site at all times during installation of the new roof perimeter flashing. Foreman must have a minimum of five (5) years experience with the installation of similar system to that specified.
- C. Successful contractor must obtain all components of roof system from a single manufacturer including any roll good materials, if required. Any secondary products that are required, which cannot be supplied by the specified manufacturer, must be recommended and approved in writing by the primary manufacturer prior to bidding.
- D. If required, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The owners representative reserves the right to inspect fabrication facilities in determining qualifications.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

1.07 JOB CONDITIONS:

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal edge system.

1.08 DESIGN AND PERFORMANCE CRITERIA:

A. Thermal expansion and contraction:

1. Completed metal edge flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

1.09 WARRANTIES:

A. Owner shall receive one (1) warranty from manufacturer of roofing materials covering all of the following criteria. Multiple warranties are not acceptable.

1. Pre-finished metal material shall require a written 20-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D-2244 or chalking excess of 8 units per ASTM D-659. If either occurs material shall be replaced per warranty, at no cost to the Owner.
2. Changes: Changes or alterations in the edge metal system without prior written consent from the manufacturer shall render the system unacceptable for warranty(ies).
3. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.
4. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of two years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work caused by such leaks or the repairs thereof.
5. Installing roofing contractor shall be responsible for the installation of the edge metal system in general accordance with the membrane manufacturer's recommendations.
6. Installing contractor shall certify that the edge metal system has been installed per the manufacturer's printed details and specifications.
7. One manufacturer shall provide a single warranty for all accessory metal for flashings, metal edges and copings, along with the warranty for metal roof areas, membrane roof areas, and any transitions between two different material types.

PART II PRODUCTS

2.01 MATERIALS:

A. Sheet Steel: Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed base flashing metal material:
 - a. Aluminum-zinc alloy (galvalume) coated steel, ASTM A792, coating designation AZ-50, in thickness of .0217 nom. /24 gauge or .0336 nom. 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.
2. Unexposed base flashing metal material:

- a. Zinc-coated steel, ASTM A653, coating designation G-90, in thickness of 0.0299 nom. / 22 gauge; 36" to 48" by coil length, chemically treated, commercial or lock-forming quality.
3. Minimum gauge of steel or thickness of Aluminum to be specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations.
4. Exposed surfaces for coated panels: 160526 Job# 07 62 00.4
 - a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer.

Weathering finish as referred by National Coil Coaters Association (NCCA).

Property Test Method Fluorocarbon*

Pencil Hardness	ASTM D-3363	HB-H	
Bend	NCAA II-2		
Cross-Hatch	ASTM D-4145	O-T	NCAA II-19
Adhesion	ASTM D-3359		
Gloss	no loss of adhesion		
Reverse Impact	ASTM D-523	25+/-5%	(60° angle)
Nominal Thickness	ASTM D-2794	no cracking or loss of adhesion	
	ASTM D-1005		
primer	0.2 mils		
topcoat	0.8 mils		
TOTAL	1.0 mils		

*Subject to minimum quantity requirements

- b. Color shall be as specified
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, .032 inch thickness unless otherwise noted, finished as follows:
 1. Mill Finish: One-side
 2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

2.02 RELATED MATERIALS:

- A. Metal Primer: Zinc chromate type.

- B. Plastic Cement: ASTM D 4586
- C. Sealant: ASTM C 920, elastomeric sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- D. Underlayment: ASTM D2178, No15 asphalt saturated roofing felt.
- E. Slip Sheet: Rosin sized building paper.
- F. Fasteners:
 - 1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.160526Job# 07 62 00.5
 - 2. Fastening shall conform to Factory Mutual 1-45 requirements or as stated on section details, whichever is more stringent.

2.03 THROUGH WALL FLASHING:

- A. Fabric thru-wall flashing shall be Copper Fabric Flashing with 3 oz. per square foot copper sheet asphalt- and pressure- laminated on both sides with a treated glass fabric. Provide Sandell's Copper Fabric Thru-Wall Flashing as manufactured by Hohmann & Barnard Inc. or Multi-Flash 500 as manufactured by York Manufacturing or Copper Fabric as manufactured by Advanced Building Products Inc.
 - 1. Flashing shall be embedded in the mortar joint of CMU backup walls or attached to metal stud walls with metal termination bar.
 - 2. Joints in Flashing shall be made by lapping a minimum of 4 inches and coating surfaces with Sandell Asphalt Trowel Mastic.
- B. wall Provide 1/8 in thick by 1 inch type 304 stainless steel termination bar at attachment of through flashing to metal stud walls. Attach termination bar to framing at 16 inches on center with self tapping screws.
 - 1. Acceptable products:
 - Type T1 as manufactured by Hohmann& Barnard Inc.
 - Termination bar as manufactured by Heckmann Building Products
 - Termination bar as manufactured by Sandell Manufacturing
 - Termination bar as manufactured by Wire Bond
 - Equal products of other manufacturers approved prior to bidding.
- C. to Sealant for top of termination bar shall be a multicomponent non-sagging urethane sealant complying with ASTM C920 for type M, Grade NS, class 25, Uses A, G, M, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include DAP, Pecora, Sonneborn, and Tremco.
 - 1. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.

2.04 BASE AND COUNTER FLASHING

- A. Base and Counter Flashing associated with roof to wall intersections shall be fabricated in accordance with Figure 4-7A SMACNA 5th ed.
1. Separate pieces of base flashing are installed as each course of shingles is applied. The upper edge of each piece of flashing should extend 2 inches above each course of shingles. The lower edge should be ½ inch above the butts of the singles forming the next course. Flashing must extend up the wall and onto the roof a minimum of 4 inches . Flashing pieces are nailed to the roof sheathing above the top of each shingle course
 2. Counter flashing is installed in a reglet left by the mason or cut by the Contractor. Wedges or tension formig shapes are used to hold the counter flashing in place and the reglet is filled with a compatable sealant. The length of each piece of counter flashing will vary with the slope of the roof but no step should be more than 8 inches high. The width will vary but should always be wide enough to cover 4 inches of the base flashing.

PART III EXECUTION

3.01 COORDINATION:

- A. Coordinate the installation of sheet metal work with the work of other trades, e.g. thru-wall flashing and counterflashing with installation of masonry work.

3.02 PROTECTION:

- A. Dissimilar metals shall not be allowed to come in contact with each other. Isolate any dissimilar metals, masonry or concrete, from metals using bituminous paint, tape, or slip sheet. Use gasketed fasteners where required to prevent corrosive actions.

3.03 GENERAL:

- A. Fastening of metal to walls and wood blocking shall comply with SMACNA Architectural Sheet Metal Manual, Factory Mutual I-60 wind uplift specifications and/or manufacturer's recommendations whichever is of the highest standard.
- B. All accessories or other items essential to the completeness of sheet metal installation, whether specifically indicated or not, shall be provided and of the same material as item to which applied.
- C. Allow sufficient clearances for expansion and contraction of linear metal components. Secure metal using fasteners as required by the system. No exposed face fastening shall be accepted.

3.04 INSPECTION:

- A. Verify curbs are solidly set and nailing strips located.
- B. Beginning of installation means acceptance of existing conditions.
- C. Field measure site conditions prior to fabricating work.
- D. Edge metal installation shall not disrupt other trades. Verify that substrate is dry, clean and free of foreign matter.

3.05 MANUFACTURED SHEET METAL SYSTEMS:

- A. Installing Contractor shall be responsible for determining if the edge metal systems are in general conformance with roof manufacturer's recommendations.
- B. Furnish and install manufactured systems in strict accordance with manufacturer's printed instructions.
- C. Provide all factory-fabricated accessories including, but not limited to, extenders, miters, joint covers, etc.

3.06 SOLDERING:

- A. Clean and roughen edges to be soldered. Apply non-corrosive flux precoat to the surfaces to be joined with solder alloy for a distance of 1-1/2" back from edge of metal. Remove flux residue with clean water. Assemble the parts and solder, using regular non-corrosive rosin flux.
- B. Soldering shall be used for sealing only and joints that must withstand mechanical stresses shall be riveted or screwed in addition to soldering.
- C. Solder shall be 50-50 tin lead type.

3.07 SHOP FABRICATED SHEET METAL:

- A. Installing Contractor shall be responsible for determining if the sheet metal systems are in general conformance with roof manufacturer's recommendations.
- B. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices.
- C. Hem exposed edges.
- D. Angle bottom edges of exposed vertical surfaces to form drip.
- E. All corners for sheet metal shall be lapped with adjoining pieces fastened and set in sealant.
- F. Joints for any gravel stop fascia system, coping cap shall be formed with a 3/8" opening between sections. The opening shall be backed by an internal drainage plate formed to the profile of fascia piece.
- G. Install sheet metal to comply with Architectural Sheet Metal manual, Sheet Metal and Air Conditioning Contractor's National Associations, Inc.

3.08 FABRIC THRU-WALL FLASHING:

- A. Install thru-wall flashing continuous near base of all exterior walls, just below drip openings in face brick wythe, and elsewhere as shown on the drawings. Flashing shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall start flush with outside face of wall, cross the cavity on mortar bed and extend up on the face of the inner wythe a minimum of 6" and be turned back into concrete block mortar joint or attached to the wall with termination bar and sealant.
- B. Head and Sill Flashing:

The flashing shall start flush with the outside of the wall or lintel angle, then carried through or up the wall as indicated. Flashing shall extend 6" beyond each side of the opening and be turned up at the sides forming a pan. All corners shall be folded, not cut.

C. Other Areas:

All membrane flashing at other locations shall be installed in accordance with manufacturer's recommendations.

D. Joining of Material:

Joint shall be made by lapping a minimum of 4" and coating the contacting surfaces with Mastic recommended by the manufacturer.

End of Section

SECTION 07 71 00 – GUTTERS AND DOWNSPOUTS

PART I GENERAL

1.01 DESCRIPTION

- A. This section includes requirements pertaining to sheet metal work for gutters and downspouts. Dimensions, details of fabrication and area of usage shall be as shown on the drawings.

1.02 SUBMITTALS

- A. Prepare and submit shop drawings for all proposed work of this section.
- B. Product data: Indicate product description, finishes and installation instructions including interface with adjacent materials and surfaces.
- C. Samples: Submit manufactured expansion joint covers.

1.03 MANUFACTURERS

- A. In order to define requirements for quality, function, sizes, gauges, grades, colors, etc. for manufactured products, the specifications for materials designate brand names of products that conform to minimum requirements that are acceptable.

1.04 COORDINATION WITH OTHER TRADES

- A. When work is to be executed in conjunction with roofing and flashing products that are to be bonded by the roofing product manufacturer, the sheet metal work shall be coordinated and executed to permit required bonds to be obtained.

1.05 REFERENCE STANDARDS

- A. Industry standards
 - 1. Kaiser Aluminum Company, "Technical Information Architectural Aluminum
 - 2. Aluminum Association, "Aluminum Sheet Metal Work in Building Construction"
- B. ASTM Standards
 - 1. Aluminum alloy sheet and plate: ASTM B209- 73
 - 2. Solder metal: ASTM B32- 70

1.06 WARRANTY

- A. Warrant flashing and sheet metal work to be free of defects in materials and workmanship. Warranty period shall be one (1) year.

PART II PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, .032 inch thickness unless otherwise noted, finished as follows:
 - 1. Mill Finish: One-side

2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 2605.
- B. Gutters shall be fabricated from 0.027 inch thick material and furnished with all necessary prefabricated components and accessories.
- C. Downspouts shall be fabricated from 0.032 inch thick material and furnished to match gutters. Furnish all brackets, bends and accessories as required.
- D. Solder Materials:
 1. Shall conform to ASTM B32, composition shall contain 50% tin and 50% lead except as specified otherwise.
 2. Solder for aluminum and metal shall be of composition as recommended by metal manufacturer.
 3. Solder flux: Muriatic acid neutralized with zinc for galvanized metal
- E. Mastic: Meet ASTM D2822-82, fibrated asphalt flashing cement.
- F. Fasteners: Same material or compatible with sheet metal being fastened
 1. Nails: Flathead, needle point, not less than 12 gauge and of length to penetrate substrate 1" minimum
 2. Expansion shields: Lead or bronze sleeves
 3. Screws: Self-tapping type, with round heads
 4. Bolts: Furnished complete with nuts and washers
 5. Rivets: Round head type
 6. Blind clips and cleats shall be the same gauge as sheet metal.
- G. Caulk: Pecor, Corp.: BR-96, non-shrink, non-drying butyl caulk

2.02 DISSIMILAR MATERIALS

- A. Where sheet metal abuts or members into adjacent dissimilar materials, execute juncture to prevent electrolysis between the two materials.

2.03 ACCESSORIES

- A. Provide all accessories essential to complete sheet metal installation of same kind of material as item to which applied. Nails, screws and bolts shall be of types and of a composition that is compatible with metal.

2.04 SHEET METAL FABRICATION:

- A. Fabricate gutter and gravel stop system to conform to Figure 1-13 A SMACNA 5th edition. Gutter shall be ogee shaped similar to Style K shown in Figure 1-2 SMACNA 5th ed.
- B. Gutter brackets shall be formed from 3/16 inch by 1 inch G-90 galvanized steel. Gutter support brackets and spacers shall be provided at 3 feet on center maximum.

- C. Downspouts shall be a premanufactured downspout system fabricated from .032 inch Aluminum in accordance Figure 1-31B1 SMACNA 5th edition. Provide downspout hangers of .028 inch Aluminum, fabricated in accordance with accordance Figure 1-35H SMACNA 5th edition. Locate downspout hangers 6 feet apart maximum, no more than 2 feet from the top and bottom of the downspout. Provide a minimum of 2 hangers per downspout.
 - 1. Basis of Design: Rectangular corrugated aluminum fabricated from 0.032 inch thick material as manufactured by Spectra Metal Sales, Inc., 6104 Boat Rock Blvd. SW, Atlanta, GA
 - a. Provide premanufactured type "A" and "B" elbows as required by project conditions.
- D. Joints, end caps, and expansion joints in gutters and downspouts shall be made be the "Rivseal" procedure. Apply Gutterseal to the joint and then draw joint tight by blind riveting.
- E. Provide expansion joints in gutters at 40 feet on center maximum.
- F. Where downspouts are subject to damage from groundskeeping equipment or vehicular traffic, provide downspout protection covers fabricated from .050 inch prefinished aluminum in accordance with SMACNA Figure 1-32I . Protection covers shall be set 1 foot above grade and shall extend to 3 feet above grade and shall be fastened to wall with 6 minimum ¼ inch diameter sleeve anchors.
- G. Provide and install 16 inch by 30 inch precast reinforced concrete splash blocks as at all downspouts that empty on grade.

PART III EXECUTION

3.01 WORKMANSHIP

- A. Except as otherwise shown or specified, workmanship of sheet metal, including method of forming joints, anchoring, cleating and provisions for expansion, shall conform to details and recommendations of the "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractors National Association.

3.02 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes workmanship. Warranty period shall be one (1) year.

End of Section

SECTION 07 72 00 – ROOFING ACCESSORIES

PART I GENERAL

1.01 SCOPE:

- A. Furnish all material, labor, equipment, and supervision necessary to fabricate, and install roofing accessories where shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit shop drawings in accordance with Section 01 33 00.

PART II PRODUCTS

2.01 ROOF CURBS:

- A. Roof Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1. Acceptable Manufacturers:

- a. Colony Custom Curbs.
- b. Conn-Fab Sales, Inc.
- c. Curbs Plus Inc.
- d. Custom Curb, Inc.
- e. LM Curbs.
- f. Loren Cook Company.
- g. Metallic Products Corporation.
- h. Pate Company (The).
- i. Equal product approved prior to bidding.

- 2. Load Requirements: Capable of supporting loads imposed by equipment shown on drawings.
- 3. Material: Galvanized steel sheet, 0.079 inch (2.0 mm) thick.
- 4. Finish: Prime painted.
- 5. Factory install wood nailers at tops of curbs.
- 6. Factory insulate curbs with 1-1/2-inch- (38-mm-) thick, glass-fiber board insulation.
- 7. Curb height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer. Fabricate units to minimum height of 12 inches (300 mm) unless otherwise indicated.
- 8. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with height tapered to match slope to level tops of units.

2.02 EQUIPMENT SUPPORTS:

- A. Provide metal equipment supports, internally reinforced and capable of supporting superimposed

live and dead loads, including equipment loads and other construction to be supported. Fabricate with welded or sealed mechanical corner joints, with integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information and equipment to be supported.

1. Acceptable Manufacturers:
 - a. Colony Custom Curbs.
 - b. Conn-Fab Sales, Inc.
 - c. Curbs Plus Inc.
 - d. Custom Curb, Inc.
 - e. LM Curbs.
 - f. Loren Cook Company.
 - g. Metallic Products Corporation.
 - h. Pate Company (The).
 - i. Equal product approved prior to bidding.
2. Load Requirements: Capable of supporting loads imposed by equipment shown on the drawings.
3. Material: Galvanized steel sheet, 0.079 inch thick.
4. Finish: Prime painted.
5. Factory-install continuous wood nailers 3-1/2 inches wide at tops of equipment supports.
6. Metal Counter-flashing: Manufacturer's standard removable counter-flashing, fabricated of same metal and finish as equipment support.
7. Fabricate units to minimum height of 12 inches (300 mm) unless otherwise indicated.
8. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.03 ROOF HATCH:

- A. Roof access hatches, in the size(s) and location(s) indicated on drawings, shall be Type S as manufactured by Bilco or equal as manufactured by Acudor, Babcock-Davis, JL Industries, Nystrom Inc., Precision Ladders LLC or alternate manufacturer approved prior to bidding.
 1. Cover and frame shall be 14 gauge G-90 paint bond galvanized steel.
 2. Cover shall be brake-formed, hollow-metal design with 1" concealed fiberglass insulation, 3" beaded, overlapping flange, fully welded at corners, and internally reinforced for 40 psf live load.
 3. Curb shall be 12" in height with integral cap-flashing, 1" fiberboard insulation, fully welded at corners, 3-1/2" mounting flange with 7/16" holes for securing frame to roof deck.
 4. Extruded EPDM rubber gasket permanently adhered to cover.
 5. Heavy-duty pintle hinges with 3/8" Type 316 stainless steel hinge pins.
 6. Slam latch with interior and exterior turn handles and padlock hasps.
 7. Compression spring operators enclosed in telescopic tubes. Automatic hold-open arm with grip handle release.
 8. Finish: Alkyd base red oxide primer.
 9. Hardware: Engineered composite compression spring tubes and steel compression springs packed in grease. All other hardware shall be zinc plated/chromate sealed.
- B. Manufacturer shall guarantee proper operation and against defects in material or workmanship for a period of five years.
- C. Provide and install one extendable safety post which meets ANSI A14.3 and OSHA requirements per roof hatch. Post shall be operable with one hand, powder-coated safety yellow, and must be compatible with the rung shape and spacing of ladder provided.

PART III EXECUTION

3.01 INSTALLATION:

- A. Install specified systems as shown on the drawings and in accordance with manufacturer's instructions and in accordance with approved shop drawings.

End of Section

SECTION 07 84 13 – FIRE STOPPING

PART I GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Penetrations through fire-resistance-rated floor, wall and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
2. Construction-gap firestopping at connections of the same or different materials in fire-rated construction.
3. Construction-gap firestopping occurring within fire-rated wall, floor or floor-ceiling assemblies.
4. Construction-gap firestopping occurring at the top of fire-rated walls.
5. Through-penetration smoke-stopping in smoke partitions.
6. Construction-gap smoke-stopping in smoke partitions.

1.02 RELATED DOCUMENTS:

A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 03 30 00 Concrete Work
Section 04 20 00 Unit Masonry
Section 07 92 00 Sealants and Caulking
Division 22 sections specifying piping penetrations.
Division 23 sections specifying ducts penetrations.
Division 26 sections specifying cable and conduit penetrations.

1.03 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.

B. Underwriters Laboratories

1. U. L. Fire Resistance Directory
 - a. Through-Penetration firestop devices (XHCR)
 - b. Fire resistance ratings (BXUV)
 - c. Through-penetration firestop systems (XHEZ)
 - d. Fill, void, or cavity material (XHHW)
2. U. L. 1479 Test Method for fire Tests of Through-Penetration Firestops, including optional air leak test.
3. U. L. Component Listing Test Criteria
4. Warnock Hersey

C. American Society For Testing And Materials Standards:

1. ASTM.E 814-88: Standard Test Method For Fire Tests of Through-Penetration Firestops.
2. ASTM 1399

D. CIE/DIN Age Testing

1.04 DEFINITIONS:

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gases and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
- E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.
- F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
- G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.
- H. 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.
- I. 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.

1.05 DESIGN REQUIREMENTS:

- A. Maintain barrier and structural floor fire resistance ratings (F rating) including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations to permit building movement and sound or vibration absorption and at other construction gaps.

1.06 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, unless otherwise indicated.
- B. Product data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specifications of construction and fabrication.
 - 2. Manufacturer's installation instructions.
- C. Shop drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
 - 1. Details of each proposed assembly identifying intended products and applicable UL System number, or UL classified devices.

2. Manufacturer or manufacturer's representative shall provide qualified engineering judgments and drawings relating to non-standard applications as needed.
- D. Applicators' qualifications statement providing evidence of compliance with all Installer's Qualifications specified herein.
- 1.07 QUALITY ASSURANCE:
- A. Installer's Qualifications: Firm specializing in installation or application of systems similar in complexity to those required for this project, plus the following:
1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
 2. At least 5 years experience with systems.
 3. Successfully completed at least 5 comparable scale projects using this system.
- B. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration, construction and any other firestop condition indicated from a single manufacturer.
- C. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- 1.08 DELIVERY, STORAGE, AND HANDLING:
- A. Deliver products in original, unopened packaging with legible manufacturer's identification.
- B. Coordinate delivery with scheduled installation date, allow minimum storage at site.
- C. Storage and Protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.
- 1.09 PROJECT CONDITIONS:
- A. Verify conditions and substrates before starting work. Unsatisfactory conditions must be corrected before proceeding.
- B. Proceed with installation only after penetrations of the substrate and supports have been installed.
- C. Environmental Requirements:
1. Furnish adequate ventilation if using solvent.
 2. Furnish forced air ventilation during installation if required by manufacturer.
 3. Keep flammable materials away from sparks or flames.
 4. Provide masking and drop clothes to prevent contamination of adjacent surfaces by firestopping materials.
 5. Comply with manufacturing recommendations for temperature and humidity conditions before, during and after installation of firestopping.
- 1.10 GUARANTEE:
- A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, or general durability or appear deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be one year from date of substantial completion.

PART II PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. 3M Fire Protection Products, 3M Center 207-1-02, St Paul, MN 55144-1000, (800) 328-1687. (Contact: Bart Russell, Exterior Materials, Inc., Knoxville, TN. Phone: 865-558-6380).
- B. International Protective Coatings Corporation, 725 Carol Ave., Oakhurst, NJ 07755 (800) 334-8796.
- C. The Rectorseal Corporation, 2830 Produce Row, Houston, TX 77023-5822 (713)928-6423.
- D. Tremco Inc. (The Euclid Chemical Co.) 19218 Redwood Road, Cleveland Ohio, 44110

2.02 MATERIALS:

- A. Fill Materials For Through-Penetration Firestop Systems:
 - 1. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.

3M Products: Fire Dam 150, Fire Dam 150+
Tremco, Inc.: Fyre-Shield
 - 2. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.

3M Products: CP25 WB+
Tremco, Inc.: Tremstop W.S. (Wrap Strip)
 - 3. Intumescent Putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.

3M Products: Moldable Putty Stix, Moldable Putty Pads
 - 4. Intumescent Wrap Strips: Single component

3M Products: FS-195+, Ultra GS 40
Tremco, Inc.: Tremstop W.S. (Wrap Strip)
 - 5. Mortar: 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.

3M Products: Fire Barrier Mortar
Tremco, Inc.: Tremco, Inc.: Tremstop M
 - 6. Intumescent Composite Sheet: One part composite system of organic/inorganic, fire-resistive elastomeric sheet, 28 gauge steel, steel wire mesh and aluminum foil.

3M Products: CS 195+
 - 7. Silicone Sealant: Moisture-curing, single-component, silicone based, neutral-curing elastomeric sealant.

3M Products: FB 2000, FB 2000+, FB 1000 N/S, FB 1000 S/L
Tremco Inc.: Fyre-Sill, Fyre-Sil S. L.
 - 8. Elastomeric Spray: One part, flexible, sprayable, water-based coating.

3M Products: Fire Dam Spray
Tremco, Inc.: Tremstop Acrylic Spray.

- B. Through-Penetration Firestopping of Fire-Rated Construction: Use endothermic sealant, intumescent sealant, intumescent putty, intumescent wrap strips, mortar, intumescent composite sheets, silicone sealant and other necessary products listed in the UL Fire Resistance Directory for the system involved or mortar systems approved by Warnock Hersey.
1. Systems or devices listed in the U. L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it confirms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos free. Mortar systems must be Warnock Hersey Approved.
 2. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of separate product included as a part of the U. L. system or device, and designed to perform this function.
- C. Construction-Gap Firestopping of Fire-Rated Construction: Use endothermic sealant, silicone sealant, elastomeric spray, intumescent sealant and other necessary products listed in the UL Fire Resistance Directory for the following conditions:
1. Construction gaps between edges of floor slabs and exterior wall construction.
 2. Construction gaps between tops of partitions and underside of structural systems.
 3. Construction gaps between tops of partitions and underside of ceiling or ceiling assembly.
 4. Control joints in fire-rated masonry partitions.
 5. Expansion joints.

2.03 ACCESSORIES:

- A. 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 firestopping manufacturer and approved by qualified testing and inspecting agency for designated fire-resistance-rated systems. Accessories include but are not limited to permanent forming/damming/backing materials including the following:
1. Semirefractory fiber (mineral wool) insulation
 2. Ceramic fiber
 3. Fire-rated formboard
 4. Backer Rod
 5. Steel Collars
 6. Steel Sleeves
 7. Temporary forming materials

PART III EXECUTION:

3.01 EXAMINATION:

- A. Verification of conditions: examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust, or the required fire resistance.

3.03 INSTALLATION:

- A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory or Mortars per Warnock Hersey approval and in accordance with manufacturer's instruction.
- B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.
- C. Where floor openings without penetrating items are more than four inches in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.
- D. Protect materials from damage on surfaces subject to traffic.
- E. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable trays, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See U. L. Fire Resistance Directory or Warnock Hersey approvals.
- F. Install smoke stopping as specified for firestopping.
- G. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, provide vertical, 12 inch wide fiber dams for full thickness and height of air cavity at maximum 15 foot intervals.

3.04 FIELD QUALITY CONTROL:

- A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.05 ADJUSTING AND CLEANING:

- A. Clean up spills of liquid components.
- B. Neatly cut and trim materials as required.
- C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

End of Section

SECTION 07 92 00 – SEALANTS AND CAULKING

PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, tools, equipment and services required to install joint sealants for the following locations:
1. Joints in exterior vertical surfaces and non-traffic horizontal surfaces as indicated below:
 - a. Perimeter joints between wall materials and frames of doors and windows.
 - b. Joints between different materials.
 - c. Other joints as indicated on the drawings.
 - d. Openings around pipes projecting through exterior walls.
 2. Joints in exterior horizontal traffic bearing surfaces as indicated below:
 - a. Control and expansion joints in concrete paving.
 3. Interior joints in vertical and vertical surfaces as indicated below:
 - a. Joints between different materials.
 - b. Joints between plumbing fixtures and adjacent materials.
 - c. Joints around pipes projecting through interior walls.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
- B Caulking in connection with ductwork is specified in Division 23.

1.03 SUBMITTALS:

- A Submit manufacturer's product and application data on products specified.
- B Submit color charts on products requiring color selection.
- C Product test reports.

1.04 QUALITY ASSURANCE:

- A Engage an experienced installer who has completed joint sealant applications similar in material, design, and extent to that indicated for the project that have resulted in construction with a record of successful in-service performance.

1.05 ENVIRONMENTAL CONDITIONS:

- A Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
 2. When joint substrates are wet.
 3. Where joint widths are less than allowed by joint sealant manufacturer for application indicated.
 4. Until contaminant capable of interfering with their adhesion are removed from joint substrates.

PART II PRODUCTS

2.01 GENERAL:

- A Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under the conditions of service and application as demonstrated by the manufacturer based on testing and field experience.
- B Match colors indicated by reference.

2.02 MATERIALS:

- A Sealant for caulking of control joints in concrete slabs shall be a two-part, Jet-Fuel-Resistant, non-sag, Polyurethane Rubber Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements relative to formulation and with ASTM C 920 for Type, Grade, Class, and Uses indicated.
 - 1. Urethane formulation: Type M, Class 25, Uses T, M, and O as applicable to joint substrates.
 - 2. Grade P for joints in horizontal paved surfaces.
 - 3. Grade NS for vertical and other joints where installation of a Grade P (self-leveling) sealant would result in sealant flowing out of joint.
- B Sealant for all exterior caulking except as noted, and at cabinets shall be a multicomponent non-sagging urethane sealant complying with ASTM C920 for type M, Grade NS, class 25, Uses A, G, M, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include DAP, Pecora, Sonneborn, and Tremco.
 - 1. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.
- C Sealant for exterior caulking in conjunction with exterior insulation and finish system shall be a single component non-sagging, neutral-curing, ultra low-modulus silicone building sealant complying with ASTM C-920 for Type S, Grade NS, class 25, Uses: A, M, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include Dow Corning, Pecora and Tremco.
 - 1. Additional movement capability: 100 percent in extension and 50 percent in compression for a total of 150 percent movement.
- D Sealant for interior use unless otherwise specified shall be a paintable type equal to DAP Acrylic Latex Caulk, Pecora AC-20 Acrylic Latex, or Tremco Acrylic Latex Caulk.
- E Sealant for interior use in conjunction with plumbing fixtures shall be a low-modulus nonacid-curing silicone sealant, type S, Grade NS, Class 25, uses: A, G, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include DAP, Pecora, Sonneborn, and Tremco.

1. Additional Movement Capability: 100 percent movement in extension and 50 percent in compression for a total of 150 percent movement.
- F Primer shall be the type recommended by the sealant manufacturer and shall be supplied by the manufacturer of the sealant used.
- G Backup material and joint fillers shall be non-staining, compatible with sealant and primer used, and of a resilient nature. Raveled strands of non-staining rope fiber or cotton wicking may be used as filler in deep joints but the filler backing up the sealant shall be rod shaped foam neoprene, foam polyethylene, or hollow vinyl extrusions. Filler material impregnated with oil, bitumen, or similar substances shall not be used in any case.
- H Bond breakers shall be polyethylene tape, pressure sensitive masking tape, or equal, as recommended by the sealant manufacturer.
- I Preformed Foam Sealants: Manufacturer's standard preformed, precompressed, impregnated open cell foam sealant manufactured from high density urethane foam impregnated with a nondrying water repellent agent: factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop watertight and airtight seal when compressed to the degree specified by the manufacturer, and complying with the following requirements:
1. Permanently mildew-resistant non-migratory, non-staining, and compatible with joint substrates and other joint sealants.
 2. Impregnating Agent: Chemically stabilized acrylic.
 3. Density: Manufacturer's standard.
 4. Backing: None
 5. Product shall be Colorseal as manufactured by Emseal Joint Systems, Westborough, MA. or equal product of Willseal or Tremco Illbruck.

2.03 JOINT SEALANT BACKING:

- A General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance
- C Closed-cell polyethylene foam, non-absorbent to liquid water and gas, non-outgassing in unruptured state.
- D Elastomeric Tubing Joint Fillers: Neoprene, butyl EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to - 26° F (-32° C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- E Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

PART III EXECUTION

3.01 EXAMINATION:

- A Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS:

- A General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C Install joint filler of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of joint fillers.
 2. Do not stretch, twist, puncture, or tear joint fillers.
 3. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
- D Installation of Sealants: 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 widths that allow optimum sealant movement capability. Install sealants at the time sealant backings are installed.

- E Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- F Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformation with sealant manufacturer's recommendations.
- 3.04 CLEANING:
- A Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.
- 3.05 PROTECTION:
- A Protect joint sealants 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 joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

End of Section

SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART I GENERAL

1.01 WORK INCLUDED:

- A Furnish and install all exterior and interior hollow metal doors, steel doorframes and frames for fixed glass windows, and all necessary incidental work in connection therewith.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 079200 Sealants and Caulking
Section 087100 Finish Hardware
Section 088000 Glazing
Section 099100 Painting

1.03 SUBMITTALS:

- A Submit schedules and shop drawings of hollow metal doors and frames to the Architect for approval before any work is fabricated.

PART II PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A Doors and frames shall be products as specified, manufactured by Steelcraft Manufacturing Company, Cincinnati, Ohio; or equal products of the following manufacturers:

Mesker Brothers, St. Louis, Mo.
Metal Products, Inc., Corbin, Kentucky
Curries Corporation, Mason City, Iowa

2.02 MATERIALS:

- A Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

- D Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.03 DOORS:

- A Doors shall be full flush construction 1-3/4" thick, made of cold, 16 gauge, cold rolled steel. Doors shall be Type B-16. Doors shall be reinforced, stiffened, sound deadened and insulated with impregnated kraft honeycomb core completely filling the inside of the doors and laminated to both inside faces of the panels.

1. All doors shall have mechanical edge seam or be fully welded and ground smooth if joint is in center of door edge.
 2. Hinge and lock edge shall have 1/8" in 2" bevel.
 3. Top and bottom #14 gauge cold, rolled steel reinforcing channels shall be spot welded within the door.
 4. Top edges of exterior doors shall be finished with flush metal closure.
 5. Hinge reinforcing shall be 8-gauge steel.
 6. Lock reinforcing shall be #16 gauge.
 7. Closer reinforcing shall be #12 gauge.
 8. Adequate reinforcing shall be provided for other hardware as required.
 9. Mortise, drill and tap for hardware, except that doors be drilled and tapped for surface-mounted hardware in the field.
- B Glass light openings shall be provided with removable metal moldings secured in place with oval head countersunk screws.
- C Glass in fire rated doors shall be 1/4" wire glass. Glass in non-label doors shall be 1/4" thick tempered clear.

2.04 FRAMES:

- A Frames shall be flush frames with 2" wide faces, formed of #16 gauge steel. Interior frames shall be fabricated from cold rolled steel. Exterior frames shall be fabricated from metallic coated steel sheet. Frames shall be set up and welded and doorframes shall be provided with temporary spreaders at bottom. Mitered corners shall have reinforcements with integral tabs for secure and easy interlocking of jambs to head. Strike jambs shall be supplied with three factory installed rubber bumpers. Mullions at pairs of doors shall be removable type.
1. Frames shall have 8 gauge steel hinge reinforcements and be mortised for hinges specified.
 2. Strike reinforcements shall be #16 gauge.
 3. Provide metal plaster guards for all mortise cutouts. Reinforcements for surface closers shall be #12 gauge.
 4. Adequate reinforcing shall be provided for other hardware as required.
 5. Mortise, drill and tap for hardware, except that frames shall be drilled and tapped for surface-mounted hardware in the field.
- B Frames shall be furnished with a minimum of six wall anchors and two adjustable base anchors of manufacturer's standard design at masonry walls and a minimum of six wall anchors (2 base) at stud walls. Anchors for labeled frames shall be UL approved type.
- C Steelcraft unitized weatherstripping will be acceptable in lieu of weatherstripping specified for exterior doors in Finish Hardware Section herein.

2.05 LOCATION OF HARDWARE:

- A Finishing hardware is specified to be furnished in "Finish Hardware" section under Division 8. Doors and frames shall be prepared for hardware from templates of the hardware to be furnished.
- B Unless otherwise specifically indicated, hardware shall be located as follows:
1. Knob locks, handle sets, and exit bolt locks; 36" from finish floor to centerline of strike.
 2. Deadlocks: 42" from finish floor to centerline of strike.
 3. Door Pulls and Single Push Bars: 42" from finish floor to centerline of grip or to centerline of push bar.
 4. Push Plates: 42" from finish floor to centerline of strike.

5. Hinges: Top hinge 9-3/4" from head of frame to centerline of hinge; bottom hinge 10-3/8" from finished floor to centerline of hinge; intermediate hinges equally spaced from top and bottom hinges. Locate top and bottom hinges at toilet stall doors 6" from top and bottom of door.

2.06 DOOR CLEARANCE:

- A Doors shall have 1/8" clearance at top, 3/32" clearance at sides, and 5/8" clearance above finished floor at the bottom, unless noted on the drawings to be undercut.

2.07 FINISH:

- A Doors and frames shall be cleaned, bonderized, and finished with one coat of baked-on prime paint.

PART III EXECUTION

3.01 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
 2. Delete first subparagraph below if not required.
 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A Remove welded-in shipping spreaders installed at factory.
- B Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION:

- A General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place with all clearances accurately maintained; comply with Drawings and manufacturer's written instructions.
- B Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb

members.

9. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D Smoke-Control Doors: Install doors according to NFPA 105.
- E Where labeled fire doors are called for on the drawings, the doors and frames shall meet the requirements of the Underwriters' Laboratories and the National Fire Protection Association and shall bear UL label.
- 3.04 ADJUSTING AND CLEANING:
 - A Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
 - B Clean grout and other bonding material off standard steel doors and frames immediately after installation.
 - C Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
 - D Galvanized Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

End of Section

SECTION 08 14 16 – WOOD DOORS

1PART I GENERAL

3.01 SCOPE:

- A Provide all labor, materials, equipment, and supervision necessary to furnish and install wood doors as shown on the drawings and specified herein.

3.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	08 11 13	Hollow Metal Doors and Frames
Section	08 71 00	Finish Hardware
Section	09 91 00	Painting

3.03 SUBMITTALS:

- A. Product Data: Submit door manufacturer's product construction data, and specifications for each type of wood door, including details of core and edge construction, trim detail for lite openings and similar components.
- B. Specific Product Warranty: Submit a copy of door manufacturer's standard door warranty. Door warranty shall provide for reasonable repair or replacement of the door as originally furnished. Manufacturer may, per its discretion, elect to use either its own or third party resources to resolve warranty claims.
- C. Shop Drawings: Submit shop drawings indicating location, size, thickness, and hand of each door; elevation of each kind of door. Provide the following information:
1. Hardware types and locations. Indicate dimensions and locations of mortises and holes for hardware of factory machined doors.
 2. Location of Hardware blocking where specified.
 3. Vision panel or louver cutout size and location
 4. Indicate requirements for veneer matching.
 5. Indicate fire label requirements including fire rating time duration, maximum temperature rise requirements, and smoke label requirements.
 6. Indicate routing of electrical raceways and dimensions and locations of cutouts in wood doors to accept electric hardware devices.
 7. Pre-finish system type and approved color(s).
- D. Samples:
1. Color samples for factory pre-finishing. Manufacturer must submit samples of not less than 3 - 5" x 8" size on specified veneer species. The sample should reasonably represent the color range of the veneer species selected.

3.04 REFERENCE STANDARDS or most recent edition.

- A. Window and Door Manufacturers Association WDMA I.S. 1-A.
- B. WDMA "How to Store, Handle, Finish, Install and Maintain Wood Doors" published by the Window and Door Manufacturers Association
- C. ANSI/HPVA HP-1-2000 - American National Standard for Hardwood and Decorative Plywood

- D. NFPA 80 - Fire Doors and Windows
- E. NFPA 252 - Standard Methods of Fire Tests for Door Assemblies
- F. Underwriters' Laboratories - UL 10C (positive pressure) - Fire Tests of Door Assemblies whichever applies.
- G. ITS (Warnock Hersey) - Certification Listings for Fire Doors
- H. ASTM E90-02 - Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

3.05 QUALITY ASSURANCE:

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer specializing in manufacturing products specified in Section 1.3 above, with a minimum of five years documented door building experience under the same ownership.
- B. Meet or exceed WDMA I.S.1-A Custom Grade, AWI (latest version) Custom Grade and / or WIC Custom Grade.
- C. Labeled Doors shall be listed and conform to the requirements of:
 - 1. Intertek Testing Services-Warnock Hersey (ITS-WH) or Underwriters Laboratories (UL).
- D. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
 - 1. Non-fire-rated doors shall comply with AWI requirements for PC-5 construction. P.C.7 doors will not be accepted.
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. 20 minute rated doors shall comply with AWI requirements for DFP-20 construction.
 - 2. 45, 60, and 90 minute rated doors shall comply with AWI requirements for Fire Rated Mineral Core; DFM-45, -60, -90 construction.
 - 3. Temperature-Rise Rating: At exit enclosures and where indicated on drawings, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

3.06 CONSTRUCTION REQUIREMENTS:

- A. All doors to have core, 2 stiles (one or two piece laminated) and 2 rails (one or two piece laminated). No voids permitted. Except where noted Type I (waterproof) adhesive is to be used.
- B. Non-Fire Rated Wood Doors - All solid core flush wood doors shall meet WDMA Door Grade
 - 1. Heavy Duty
 - 2. PC - Particle Core. Stiles and rails securely bonded to the core and entire unit abrasively planing prior to application of faces to assure uniform thickness of all components.
- C. Fire Rated Wood Doors: Where fire-resistance classifications are shown or scheduled, provide doors which are like the non-fire rated doors above but comply with the AWI standards for fire rated doors. Doors will meet the requirements of NFPA No. 80 "Standard for Fire Doors and

Windows". Fire rated doors shall bear the label of an independent testing agency having approval of the local building authorities.

3.07 PROJECT CONDITIONS:

- A. Delivery/Storage/Handling: Store and protect doors in accordance with manufacturer's recommendations and "How to Store, Handel, Finish, Install and Maintain Wood Doors" published by the Window and Door Manufacturers Association (WDMA).
1. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse.
 2. Certain wood species are light sensitive. Protect all doors from exposure to light (artificial or natural) after delivery.
 3. Do not subject interior doors to extremes in either heat or humidity. HVAC systems must be operational and balanced, providing a temperature range of 50 to 80 degrees Fahrenheit and 30% to 60% relative humidity.
 4. When handling doors, always lift and carry. Do not drag across other doors or surfaces. Handle with clean hands or gloves.
 5. Each door will be marked with the opening number.

3.08 GUARANTEE:

- A A written guarantee from door manufacturer shall be delivered to the Architect upon completion of the work. The doors shall be guaranteed for the life of the original installation in accordance with N.W.M.A. Standard Door Guarantee. Warranty shall include finishing and hanging.

2PART II PRODUCTS

3.01 FLUSH WOOD DOORS:

- A Wood flush doors, except full glass doors and label doors, shall be 5-ply, particle board core, flush doors, DPC-1 by Marshfield Doorsystems Inc. or Novodoor by Algoma. PC-7 doors will not be accepted. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements. Doors shall be stained and finished at the factory and delivered to the project in individual protective packaging. Finish shall be a catalyzed liquid finish complying with AWI Section 1500, to meet or exceed System TR-6
- B Wood flush label doors shall be mineral core, flush doors, DFM Series by Marshfield Doorsystems Inc., or Weldrok Core by Algoma. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements. Doors shall be stained and finished at the factory and delivered to the project in individual protective packaging.
- C Veneer:
1. Species: As indicated on drawings. If not indicated provide White Birch.
 2. Cut: As indicated on drawings. If not indicated provide Rotary Cut.
 3. Face Grade: WDMA - |A|. As described in HPVA tables AWI section 1300 and ANSI/HPVA-1-2000.
 4. Faces shall be assembled with Type I waterproof glue.
- D Matching:
1. Each leaf: Book Match
 2. Leaves of each Pair: Book Match
 3. Set Match all set of pairs separated by less than 12" between frames.

4. Assembly of spliced veneer on face shall be Running Match.
 5. The number of flitch sheets used, per door, shall not vary by more than two (2) for any two doors in the building separated by less than forty (40) feet and shall never exceed six (6) per door.
- E Door louvers, were required on the Architectural or Mechanical plans shall be manufacturer's standard Flat-Slat, louvers in wood species to match door veneer and sized per the Architectural Drawings.
1. Position high side of louver toward privacy (occupant) side of door.
- F Openings for glazed panels shall be cut at the factory and provided with wood beads to support glass. Vision panels in fire rated wood doors shall have wood veneered noncombustible beads to support glass. Doors are to be factory-glazed.
- G Door grills shall be Anemostat Inverted V Louvers with double flange #CHDL-2F 20 gauge, prime painted. Size shall be as indicated on the Mechanical Drawings.
- H Doors shall meet and bear UL labels as called for in the Door Finish Schedule.

2.02 DOOR FABRICATION:

- A. Factory Pre-fit and Bevel Doors 3° bevel or bevel to suit frame sizes indicated, with 1/4" prefit in width, + 0"/- 1/32", tolerances. Prefit top of door 1/8" +1/16"/-0", and undercut as designated by floor condition. For fire-rated doors comply with NFPA 80 for pre-fitting and undercutting. Pairs to be 1/8" +1/16"/-0" between leaves.
- B. Factory Pre-Machine Doors for Hardware that is not surface applied.
1. Locations and function hole patterns to comply with specified hardware manufacturers template and requirements of NFPA 80 if it applies.
 2. Factory pre-drill all hinge screw pilot holes.
 3. Comply with door manufacturer's requirements to maintain full warranty.
 4. Specific locations for hardware will be coordinated between frame and door manufacturer. Location of hardware will be placed to assure the door warranty is not voided. Manufacture defined light-lock conflicts are to be followed to maintain both Warranty and Fire Label requirements.
 5. Specific hardware preps will be per hardware schedule(s) provided unless in conflict with Warranty or Fire Label. Hardware preps to be neatly and cleanly squared as required per hardware templates.
 6. Pre machine all metal astragals and metal channels to be supplied when required by the fire label. re fire-ratings will not allow metal-free edge(s).

2.05 FACTORY FINISHING:

- 3A. Doors to be factory finished to meet or exceed WDMA I.S. 1A TR-6.
1. Stain: As scheduled on drawings. If not scheduled on drawings, color to be selected from Manufacturer's standard selection.

4PART III EXECUTION

3.01 INSTALLATION:

- A Examine installed door frames prior to hanging door: Verify that frames comply with indicated requirements for type, size, location, and swing and have been installed with plumb jambs and level heads.

- B Reject doors with defects.
 - C Do not proceed with installation until unsatisfactory conditions have been corrected.
 - D Install wood doors to comply with manufacturer's instructions and referenced quality standard
 - E Install fire-rated doors in corresponding fire-rated frames according to the requirements of NFPA 80.
 - F Job-fit Doors: Align and fit doors in frames with uniform clearances and bevels indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - G Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch at jambs and heads, 1/16 inch per leaf at meeting stiles for pairs of doors, and 1/8 inch from bottom of door to top of floor finish or covering. Where threshold is shown or is scheduled, provide 1/4 inch clearance from bottom of door to top of threshold. Provide 3/4 inch clearance from bottom of door to top of floor finish or covering at doors noted on Mechanical Drawings to be undercut.
 - H Fitting Clearances for Fire-Rated-Doors: Comply with NFPA 80.
- 3.02 ADJUSTING, CLEANING AND PROTECTION:
- A Operation: Rehang or replace doors that do not swing or operate freely. Adjust as necessary to accommodate operating hardware.
 - B Finished Doors: Refinish or replace doors damaged during installation
 - C Protection: Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion including keeping door protective covering in place until just before Substantial Completion.

End of Section

SECTION 08 36 15 – GLAZED ALUMINUM OVERHEAD SECTIONAL DOORS

PART I GENERAL

1.01 SCOPE:

- A Furnish and install Glazed Overhead Sectional Doors, where shown on the drawings, complete with frame, hardware, anchors, electric operators, remote controls, and all other necessary accessories required for a full operable door assembly.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit Shop drawings to the Architect for approval.

PART II - PRODUCTS

2.01 MATERIALS:

- A Overhead Sectional Door shall be the size shown on the drawings as manufactured by Overhead Door. Additional alternate manufacturers approved to provide product equal to or exceeding specified requirements include Cornell, Atlas Door, Clopay and Wayne Dalton.
- B Glazed Aluminum Overhead Sectional Door shall be 511 Series, stile and rail doors secured with 1/4" diameter through rods
- C Units shall have the following characteristics:
 - 1. Panel Thickness: 1-3/4"
 - 2. Aluminum Panels: 0.050" thick aluminum.
 - 3. Stiles and Rails: 6063 – T6 aluminum.
 - 4. Springs: 10,000 cycle rated.
 - 5. Glazing: 1/4" Tempered.
 - 6. Clear anodized finish.
 - 7. Windload Design: ANSI/NAGDM 102 standards and 15 lb positive and negative pressure as required by code.
 - 8. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- D Lock: Interior galvanized single unit.
- E Weatherstripping: Flexible PVC jamb seals, header seal, and on bottom section
- F Electric motor operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Provide backup hand chain operator for use during power outages.
- G Entrapment Protection: Photoelectric sensors
- H Operation Controls: Push button and key operated control stations with open, close, and stop buttons for flush mounting, for both interior and exterior locations.
- I Special Operation: Provide radio control operation actuator.

PART III - EXECUTION

3.01 PREPARATION:

- A Take field dimensions and examine conditions of substrates, supports, and other conditions under which work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 INSTALLATION:

- A Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- B Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.03 ADJUSTING AND CLEANING:

- A Test high doors for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

End of Section

SECTION 08 41 13 - ALUMINUM ENTRANCES AND STOREFRONTS

PART I - GENERAL

1.01 SCOPE:

- A. Furnish all labor, material, equipment, and supervision to provide, fabricate, and install aluminum/glass doors, hardware, thermally-broken aluminum framing, and as listed herein and shown on the drawings.

1.02 GENERAL:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	08 71 00	Finish Hardware
Section	08 80 00	Glazing

1.03 SUBMITTALS:

- A. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:
 - 1. Fabrication methods
 - 2. Finishing
 - 3. Hardware
 - 4. Accessories
- B. Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:
 - 1. Elevations
 - 2. Detail sections of typical composite members.
 - 3. Hardware, mounting heights
 - 4. Anchorages and reinforcements
 - 5. Expansion provisions
 - 6. Glazing details
- C. Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

1.04 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5 years successful experience in the installation of systems similar to those required.
- B. Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5 years successful experience in the installation of systems similar to those required.
- C. Design Criteria: Drawings are based on one manufacturer's entrance and storefront system. Another manufacturer's system of a similar and equivalent nature will be acceptable when, in the Architect's sole judgment, differences do not materially detract from the design concept or intended performance.

1.05 PROJECT CONDITIONS:

- A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrications schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

1.06 WARRANTY:

- A. Warranty period for aluminum entrances and storefront is 3 years after the date of substantial completion.

PART II PRODUCTS

2.01 SYSTEM DESCRIPTION:

- A. Performance Requirements: Provide aluminum entrance and storefront assemblies that comply with specified performance characteristics. Each system shall be tested by a recognized testing laboratory or agency in accordance with specified test methods. Provide certified test results.
- B. Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120° F (67° C), that could cause a metal surface temperature range of 180° F (100° C) within the framing system.
- C. Wind Loading: Provide assemblies capable of withstanding a uniform test pressure of 20 psf inward and 20 psf outward when tested in accordance with ASTM E 330.
- D. Fixed Framing Transmission Characteristics: Provide aluminum entrance and storefront framing system that complies with requirements indicated for transmission characteristics.
- E. Air Infiltration: Provide framing system with an air infiltration rate of not more than 0.06 CFM per sq. ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 6.24 psf.
- F. Water Penetration: Provide framing systems with no water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf. per sq. ft.
- G. Aluminum Entrance Transmission Characteristics: Provide entrance doors with jamb and head frames that comply with requirements indicated for transmission characteristics.
- H. Air Infiltration: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.

2.02 STOREFRONT/ENTRANCE MANUFACTURERS:

- A. Provide complete system meeting the specified requirements as manufactured by one of the following approved manufacturers:
 - 1. United States Aluminum Corporation
 - 2. Wausau Window and Wall Systems
 - 3. Kawneer Company, Inc.
 - 4. Vistawall Architectural Products
 - 5. YKK AP America Inc.
 - 6. Tubelite
 - 7. Oldcastle Building Envelope
 - 8. EFCO Corporation
 - 9. Doralco Architectural Metal Solutions

2.03 MATERIALS:

- A. Storefront/Entrance Members: Provide aluminum alloy 6063-T5 with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate. Wall thickness of all door sections, except glazing beads, shall be .125" minimum. Wall thickness of frame members, except glazing beads and glazing pockets, shall be .125" minimum.
- B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
- C. Reinforcement: Where fasteners crew-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
- D. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
- E. Provide Phillips flat-head machine screws for exposed fasteners.
- F. Concealed Flashing: Provide 26 gauge minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- G. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- H. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- I. Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- J. Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- K. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of Glazing section of these specifications.

2.04 COMPONENTS:

- A. Storefront Framing System: Provide inside-outside matched resilient flush-glazed storefront framing system equal to Trifab VG 451T as manufactured by Kawneer for 1" glazing. Frames and side lights shall be accurately joined at corners with unexposed screws in extruded splines, which are an integral part of all horizontal members. All glazing shall be flush, including the horizontal muntins and sills. Glass shall be held in place by a glazing vinyl on both sides of glass for puttyless glazing. An expansion mullion shall be provided for every 30 lineal feet of continuous frames.
- B. Aluminum Door Frames: Fabricate tubular and channel frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards; reinforce as necessary to support required loads.

C. Stile and Rail Type Aluminum Doors:

1. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
2. Design: Provide 1-3/4" thick, medium Stile doors equal to #400 Medium Stile Mid Panel Panic door as manufactured by U.S. Aluminum. Bottom rail shall be 10".

D. Sliding Entrance Doors:

1. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
2. Design: Provide 1-3/4" thick, Narrow Stile Sliding Entrance doors equal to #990 by Kawneer Company Inc. Bottom rail shall be 10".
3. Fabrication: Frame members shall have an overall depth of 4 1/2" and shall be connected with a minimum of two spline screws per joint. Fixed and sliding panels shall have a nominal depth of 1 1/2" and shall have overlapped joints to prevent racking and provide a positive weather-seal. Sliding panels shall be equipped with two center pivoted, spring loaded, tandem wheel assemblies, each capable of supporting a moving weight of 275 pounds and shall be equipped with two self-contained, all stainless steel casters. Sliding panels shall not be removable when in a locked position.

2.05 FINISHES:

- A. Provide NAAMM AA-M12C22A31, Class I (mechanical finish, non-specular as fabricated; chemical etch, medium matte; Anodic Coating: Architectural Class I clear coating 0.018 mm or thicker) complying with AAMA 607.1 on all interior aluminum.
1. Color: Clear Anodized Aluminum #14 or Equal

2.06 STOREFRONT/ENTRANCE HARDWARE:

- A. General: Refer to hardware section in Division 8 for requirements for hardware items indicated to be provided by the Finish Hardware supplier.
- B. Provide manufacturer's Type 10 heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.
- C. Offset Pivots: ANSI/BHMA A156.4, Grade 1 with exposed parts of cast aluminum alloy. Provide top, bottom, and intermediate pivots at each door leaf.
- D. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
 2. Exterior Hinges: Stainless steel, with stainless-steel pin
 3. Quantities:
 - a. For doors up to **87 inches (2210 mm)** high, provide 3 hinges per leaf.
 - b. For doors more than **87 and up to 120 inches (2210 and up to 3048 mm)** high, provide 4 hinges per leaf.

- E. Surface-Mounted Overhead Closers: Provide surface-mounted overhead closers; modern type with cover, for hinge side installation; comply with ANSI A156.4, Grade 1. Comply with manufacturer's recommendations for size of closer, depending on door size, exposure to weather and anticipated frequency of use.
- F. Door Stop - Provide floor or wall mounted door stop, as appropriate, with integral rubber bumper; comply with ANSI A156.16, Grade 1.
- G. Deadlocks: Provide mortised maximum security type deadlocks, with minimum 1" long pivoted bolt and stainless steel strike box; comply with ANSI A156.5, Grade 1.
- H. Push/Pull Handles: Provide No. PR032 pull and No. PR031 push set in US26D Satin Chrome finish.
- I. Thresholds: Provide extruded aluminum panic threshold with compressible bulb weatherstrip similar to National Guard 896 V of size required in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers.

2.07 SLIDING ENTRANCE HARDWARE:

- A. General: Refer to hardware section in Division 8 for requirements for hardware items indicated to be provided by the Finish Hardware supplier.
- B. Provide manufacturer's Type 10 heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.
- C. Pulls: Interior pull shall be equal to Kawneer Option 4 extruded pull with thumb-turn. Exterior pull shall be equal to Kawneer Option 5 extruded pull with cylinder lock.
- D. Lock shall be Adams Rite 1848 stainless steel hook bolt lock with mortise cylinder.

PART III EXECUTION

3.01 EXAMINATION

- A. Swing/fold doors: Because of the large dimensions involved and the weight and movement of the panels, verify the structural integrity of the header with the deflection limited to less than L/720 of the span with a maximum deflection of 3/8".
- B. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.
- C. Installation of units constitutes acceptance of existing conditions.

3.02 FABRICATION:

- A. General: Sizes of door and frame units and profile requirements are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.
- C. Preglaze door and frame units to greatest extent possible.
- D. Do not drill and tap for surface-mounted hardware items until time of installation at project site.

- E. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- F. Welding: Comply with AWS Recommendations; grind exposed welds smooth and restore mechanical finish.
- G. Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.
- H. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.
- I. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- J. Uniformity of Finish: Abutting extrude aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- K. Fasteners: Conceal fasteners wherever possible.
- L. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
- M. Provide EPDM or vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
- N. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

3.03 INSTALLATION:

- A. Comply with manufacturer's instructions and recommendations for installation.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.
- C. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.
- D. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- E. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.
- F. Refer to "Glass and Glazing" section of Division 8 for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.
- G. Where required by the details, provide column covers of 0.040" aluminum finished to match storefront material. Provide profiles as detailed.
- H. Continuous along the bottom of all openings provide 0.040" aluminum field flashing.

- I. If necessary, provide drain connections from lower track.

3.04 ADJUSTING:

- A. Adjusting operating hardware to function properly for smooth operation without binding, and for weathertight closure.

3.05 CLEANING:

- A. Clean the complete system, inside and out, upon completion of construction, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.06 PROTECTION:

- A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

End of Section

SECTION 08 71 00 - FINISH HARDWARE

PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, tools, equipment, and supervision as required to properly and completely equip all doors as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, supplemental Conditions and Division 1, General Requirements, apply to the work under this section.

Section	08 11 13	Hollow Metal Doors and Frames
Section	08 14 16	Wood Doors
Section	08 33 23	Overhead Coiling Doors
Section	08 36 15	Overhead Sectional Doors
Section	08 41 13	Aluminum Storefront
Division	26	Electrical

1.03 QUALITY ASSURANCE:

- A Obtain each type of Hardware (i.e. locks) from a single manufacturer.
- B "Supplier" refers to a recognized architectural hardware supplier, with warehouse facilities, furnishing hardware for not less than 2 years in the project's vicinity. Supplier must be or employ a full time experienced Architectural Hardware Consultant (AHC – Certified by the Door and Hardware Institute) who, at reasonable times during the course of the work, is available for consultation with the Owner, Architect and Contractor about the project's requirements.

1.04 SUBMITTALS:

- A Submit hardware schedule in manner indicated below. Coordinate hardware with doors, frames, and related work to insure proper size, thickness, hand, function and finish of hardware.
- B Final Hardware Schedule: Based on finish hardware, organize a schedule into "hardware sets" containing all items required for each door or opening. Include the following information:
1. Type, style, function, size, finish and manufacturer of each hardware item.
 2. Explanation of abbreviations, symbols, codes, etc. contained in schedule.
 3. Fastening and other pertinent information.
 4. Location of hardware set cross-referenced to drawings.
 5. Mounting locations for hardware.
 6. Door frame size and material.
 7. Keying information.
- C Submit schedule at earliest possible date since acceptance of hardware schedule must precede fabrication of other work (i.e. hollow metal frames) critical to construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to a coordinated review of hardware schedule.
- D Submit separate keying schedule indication implementation of the Owner's final keying instructions.
- E Furnish templates to fabricators of doors, frames, and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of each other's work, to confirm that adequate provisions are made for proper location and installation of hardware.
- F No hardware shall be ordered until hardware schedule has been approved by the Architect.

1.05 PACKING AND MARKING:

- A All hardware shall have the required screws, bolts, and other fasteners necessary for its' installation

packed in the same package as the hardware. Each package shall be legibly and adequately labeled to indicate the part of the work for which it is intended.

- B Hardware shall include such adjusting tools and instructions as furnished by the manufacturer as standard practice. Upon completion of the work, the Contractor shall turn over to the Owner or his representative all such tools, instructions and emergency keys.

PART II PRODUCTS

2.01 GENERAL:

- A Coordinate finish hardware work with work of other trades as required.
- B Cooperate with Finish Hardware supplier in scheduling dates for submittals and delivery of templates and finish hardware.

2.02 MATERIALS:

- A Catalog numbers used in the schedule are as follows:

Butts	- Hager Hinge Co.
Locksets	- Yale Security
Closers	- Yale Security
Push, Pull, Kick Plates, Stops, Misc.	- Hager Hinge Co.
Thresholds, Weatherstrip, Drip Caps	- National Guard Products
Magnetic Holders	- Rixson/Firemark
Overhead Stop & Holders	- Glynn Johnson
- B Labeled Doors: Hardware for labeled fire doors shall be UL listed and shall be labeled where required by NFPA standards.
- C Maintenance Requirements: Furnish a complete set of specialized tools and instructions for maintenance, adjustment, removal and replacement.

2.03 FINISH:

- A Finish to be Satin Chrome, US26D for all items unless otherwise scheduled. Closers to be sprayed Aluminum to match remainder of hardware.
- B Push, pull and kick plates and overhead holders shall be Satin Stainless Steel, US32D.
- C Thresholds and drip caps to have clear anodized finish.

2.04 KEYING:

- A All locks shall be master keyed into a new master key system. Furnish six (6) master keys and four (4) keys per lock. Furnish a construction master key system for use during building construction. Remove construction keying at completion of project. Furnish twelve (12) construction master keys.

2.05 BUTTS:

- A Butts, unless scheduled otherwise, shall be BB1279, 4.5" x 4.5" for doors not more than 36" wide and 5" x 4.5" for doors over 36" wide.
- B Provide two (2) pair butts for doors over 7'2" high.
- C Provide non-removable pins for all out swinging exterior doors.

2.06 DOOR STOPS:

- A Except where overhead door holders are scheduled, provide 236W Series stop for each door leaf. Substitute type 241F Series of the proper height where wall stop cannot be installed.

2.07 DOOR MUTES:

- A Mutes for hollow metal doorframes shall be GJ-64. Three mutes required for single swinging doors and two for pairs of doors. Omit for exterior openings.

2.08 CLOSERS:

- A Where closers are scheduled, provide types as specified for exterior and interior openings. Size shall be as recommended by the manufacturer.
- B Provide brackets for closers on exterior out swinging doors and for other doors as required.
- C Provide hold-open arms for all exterior doors and where scheduled for other doors.
- D Provide regular arm or parallel arm as required to mount closers in rooms away from public areas.

2.09 LOCKSETS:

- A Provide types as specified with design as specified at all locations. Cylindrical locksets shall be lever handle with free wheeling levers when lockset is in locked mode.

2.10 KICKPLATES:

- A Provide kick plates 8" high, unless noted otherwise, 2" less than nominal door width for single doors and 1" less than nominal door width for pairs of doors. Kick plates shall be 0.050" thick and beveled on all edges.

2.11 SCHEDULE OF DOOR HARDWARE:

Hardware Set 1 - each to have:

Hardware complete by Aluminum Door manufacturer, except the following:

1 Cylinder Rim/Mortise	Schlage as required	SCH	626
1 Threshold	425 x Full Opening Width	NGP	Mil
2 Door Sweeps	200NA	NGP	628

Hardware Set 2 - each to have:

Hardware complete by Aluminum Door manufacturer.

Hardware Set 3 - each to have:*

3 Butt Hinges	BB1191 4.5" x 4.5" NRP	HAG	626
1 Exit Device	99NL	VON	626
1 Rim Cylinder	Schlage as required	SCH	626
1 Closer	1461 S-Cush	LCN	689
1 Kick Plate	190S 10" x 2" LDW	HAG	630
1 Auxiliary Door Stop	259H	HAG	626
1 Threshold	425 x Full opening width	NGP	Mil
1 Weather Seal	127NA x Head and Jambs	NGP	628
1 Door Sweep	200NA	NGP	628
1 Drip Cap	16A	NGP	628

*Existing doors to remain, verify hardware sizes and applications for proper fit and function.

Hardware Set 4 – each to have:

3 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
1 Lever Storeroom	ND80PD x SPA	SCH	626
1 Door Closer	1461 Rw/Pa	LCN	689
1 Kick Plate	190S 10" x 2" LDW	HAG	630
1 Door Stop	236W	HAG	626
3 Silencers	SR64	IVE	...

Hardware Set 5 – each to have:

3 Butt Hinges	BB1168 4.5" x 4.5"	HAG	652
1 Exit Device	99L-NL x 17 Lever	VON	626
1 Rim Cylinder	Schlage as required	SCH	626

1 Closer	1461 Rw/Pa	LCN	689
1 Kick Plate	190S 10" x 2" LDW	HAG	630
1 Door Stop	236W or 242F as required	HAG	626
3 Silencers	SR64	IVE	--

Hardware Set 6 – each to have:

Cased Openings, no hardware required.

Hardware Set 7 – each to have:

3 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
1 Lever Storeroom	ND80PD x SPA	SCH	626
1 Door Stop	236W or 242F as required	HAG	626
3 Silencers	SR64	IVE	--

Hardware Set 8 – each to have:

1 Barn Door Hardware Set	Beyerle Flatec I – Single Set (USU45DS-2100EF)	BEY	630
1 Track Rail	USO200EF	BEY	630
2 Trolleys	USO121DS-EF	BEY	630
3 (4) Wall Mounts	USO215EF	BEY	630
2 Softstops Soft-Tec	USO290EF	BEY	630
1 Door Bottom guide	USH268K	BEY	--
Hanger Bolts	as required		
1 Deadlock	2001SDL-3	ALH	630
1 Mortise Cylinder	Schlage as required	SCH	626
1 Wall mounted Strike	2001BSTK	ALH	630
1 Pull Set	7200P (BTB)	ALH	630

Hardware Set 9 – each to have:

3 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
1 Lever Classroom	ND70PD x SPA	SCH	626
1 Door Stop	236W	HAG	626
3 Silencers	SR64	IVE	--

Hardware Set 10 – each to have:

1 Barn Door Hardware Set	Beyerle Flatec I - Bi-parting Set – (110.00468)	BEY	630
2 Track Rails + Connector	USO202-4876EF	BEY	630
4 Trolleys	USO121DS-EF	BEY	630
8 (10) Wall Mounts	USO215EF	BEY	630
2 Softstops Soft-Tec	USO290EF	BEY	630
2 Door Stoppers	USO256EF	BEY	630
2 Door Bottom guide	USH268K	BEY	--
Hanger Bolts	as required		
1 Deadlock	2001SDL-3	ALH	630
1 Mortise Cylinder	Schlage as required	SCH	626
2 Pull Sets	7200P (BTB)	ALH	630

Hardware Set 11 – each to have:

3 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
1 Lever Office	ND53PD x SPA	SCH	626
1 Door Stop	236W	HAG	626
3 Silencers	SR64	IVE	--

Hardware Set 12 – each to have:

3 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
1 Lever Office	ND50PD x SPA	SCH	626
1 Door Closer	1461 Rw/Pa	LCN	689
1 Kick Plate	190S 10" x 1" LDW (Pull Side)	HAG	630
1 Kick Plate	190S 34" x 2" LDW (Push Side)	HAG	630
1 Door Stop/holder	327F	HAG	626

3 Silencers	SR64	IVE	--
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Hardware Set 13 – each to have:

Existing to remain, no hardware required.

Hardware Set 14 – each to have:

3 Butt Hinges	BB1168 4.5" x 4.5"	HAG	652
1 Push Plate	30S 8" x 16" – (4" width for "N" doors)	HAG	630
1 Pull Plate	H33G 4" x 16"	HAG	630
1 Door Closer	1461 Rw/Pa	LCN	689
1 Kick Plate	190S 10" x 2" LDW	HAG	630
3 Silencers	SR64	IVE	--

Hardware Set 15 – each to have:

6 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
2 Flush Bolts	282D	HAG	630
1 Dust Proof Strike	280X	HAG	630
1 Lever Classroom	ND70PD x SPA	SCH	626
1 Door Closer	1461 Rw/Pa (Active only)	LCN	689
2 Kick Plates	190S 10" x 1" LDW	HAG	630
2 Door Stops	236W	HAG	626
3 Silencers	SR64	IVE	--

Hardware Set 16 – each to have:

Hardware complete by Overhead door Supplier.

Hardware Set 17 – each to have:

3 Butt Hinges	BB1279 4.5" x 4.5"	HAG	652
1 Lever Passage	ND10S x SPA	SCH	626
1 Door Stop	236W	HAG	626
1 Threshold	513 x Full opening width	NGP	628
1 Sound gasketing	127NA x Head and Jambs	NGP	628
1 Auto Door Bottom	220NA W/closed ends	NGP	

Hardware Set 18 – each to have:

1 Track	TSPIT1MF0060	CS	626
2 Door Stops	M6 DKM0620	CS	
1 Flush Side Handle	CL1000I3000	CS	
1 Finger Edge Pull	CL800A4020	CS	

PART III EXECUTION:

3.01 INSTALLATION:

- A Locations of hardware shall be in accordance with the recommendations of the National Builders Hardware Association for detailed locations.
- B Install hardware in accurate conformity with the manufacturer's templates.
- C Push and Pulls: Pull plates shall be through-bolted with bolt heads concealed behind push plated.
- D Lock trim shall be as listed in schedule, or equivalent of other approved manufacturers. Dummy trim levers and roses shall be identical to those supplies with locksets. All locksets shall be beveled 1/8" in 2".

3.02 ADJUSTMENT AND CLEANING:

- A Check and adjust each operating item to ensure proper functioning of each unit. Replace units which cannot be adjusted to operate properly.
- B Clean adjacent surfaces soiled by hardware installation.
- C Whenever hardware installation is completed more than one month prior to acceptance or occupancy of building or space, during the week prior to acceptance or occupancy, make final check and adjustment of all items. Clean operating items and restore proper function and finish of hardware and doors. Adjust door control devices to compensate for permanent heating and ventilating conditions.
- D During final adjustment of hardware, instruct Owner's personnel in proper adjustment and maintenance procedures for hardware operations and finished.

End of Section

SECTION 08 80 00 - GLAZING

1PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials and equipment, and perform all work to install glass in doors, in windows in exterior walls, and in fixed-glass hollow metal view windows on the interior.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 07 92 00 Sealants and Caulking

1.03 QUALITY OF GLASS:

- A Glass shall meet or exceed the requirements of Federal Specifications DD-G-451C and each piece of glass shall bear factory applied label. Tempered glass shall meet the requirements of Federal Specification DD-G-1403B. Glass shall be equal to that manufactured by PPG Industries, Inc.; Libby-Owens-Ford Company; or ASG Industries.
- B Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

1.04 SUBMITTALS:

- A Product Data: For each glass product and glazing material indicated.
- B Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass.
1. Each color of tinted float glass.
 2. Coated vision glass.
 3. Wired glass.
 4. Insulating glass for each designation indicated.
- C Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- E Qualification Data: For installers.

1.05 WARRANTY:

- A Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that suffer failure of seal (as indicated by dust accumulation on inner surfaces, fogging, or accumulation of vision obstructing film on inner surfaces) during normal usage due to causes other than breakage, improper maintenance, or improper cleaning. Replacements shall be furnished F.O.B. point of manufacturer, freight allowed Project site, within the specified warranty period indicated below
1. Insulated Glass: Manufacturer's standard, ten year minimum period.
 2. Float Glass: Manufacturer's standard, five year minimum period.
 3. Laminated Glass: Manufacturer's standard, five year minimum period.

4. Mirrors: Manufacturer's standard fifteen year period protecting against silver spoilage

2PART II PRODUCTS

2.01 TYPES OF GLASS:

- A Glass for use in exterior entrance doors and elsewhere as required by Federal and State Safety Glazing Laws shall be tempered safety glass conforming to requirements of Federal Safety Standard 16CFR1201.
- B. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- C. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.
 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- B Tinted glass in exterior vision windows shall be Twindow 1" thick insulated glass with 1/2" air space and two 1/4" Lites, interior lite clear, exterior lite solar gray, as manufactured by PPG Industries and shall meet the certification requirements of I.G.C.C. for a Class CBA rating. Glass shall meet the quality criteria of Federal Specification DD-G-451D. Coatings shall be applied under controlled factory conditions of the manufacturer.
 1. Low-E Coating or Film: Pyrolytic or sputtered on second or third surface.
 2. Low-E Insulating glass units shall have a Maximum U value of 0.29, a Maximum Shading Coefficient of 0.37 and a Maximum Solar Heat Gain Coefficient of 0.29
- C Reflective glass in exterior vision windows shall be Twindow 1" thick insulated glass with 1/2" air space and two 1/4" lites: interior lite clear, exterior lite Solarcool® gray glass (reflective coating on #2 surface) as manufactured by PPG Industries and shall meet the certification requirements of I.G.C.C. for a Class CBA rating. Glass shall meet the quality criteria of Federal Specification DD-G-451D. Coatings shall be applied under controlled factory conditions of the manufacturer.
 1. Low-E Coating or Film: Pyrolytic or sputtered on second or third surface.
 2. Low-E Insulating glass units shall have a Maximum U value of 0.29, a Maximum Shading Coefficient of 0.37 and a Maximum Solar Heat Gain Coefficient of 0.29
- D Mirrors: Tempered float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to glass surface to produce a coating system complying with FS DD-M-411.
 1. Cut mirrored glass to final sizes and shapes to suit Project conditions.
 2. Treat edges with flat polished edge.
 3. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 4. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

- E Glass for interior butt jointed glass panels shall be 1/2" thick clear uncoated, fully tempered float glass Type I (transparent glass, flat), Class 1 (clear) conforming to requirements of Federal Safety Standard 16CFR1201.
- F All spandrel glass shall be ceramic coated spandrel glass: ASTM C 1048, Condition B(spandrel glass, one-surface ceramic coated), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), and complying with requirements specified .
1. Fallout Resistance: Provide spandrel units identical to those passing fallout resistant test for spandrel glass specified in ASTM C 1048.
 2. Kind of heat treatment: Kind HS (heat strengthened) and Kind FT (fully tempered) where coated safety glass is designated or required.
 3. Location of ceramic coating: Fourth surface.
 4. Ceramic coating color and pattern: Provide color and pattern to match specified vision lites.

2.02 GLASS SIZES:

- A Obtain glass sizes at the building or from manufacturer of frames and sashes into which glass is to be set. Responsibility for correct glass size rests with the Contractor.

2.03 GLAZING MATERIAL:

- A Unless factory glazing is provided, elastic glazing compound shall be Pecora Chemical Company Challen Glazing Compound M-251, or equal products of Tremco or DAP. Butyl tape shall be Tremco Polyshim Tape.

2.04 GLAZING ACCESSORIES:

- A Channels for receiving butt jointed glass shall be the product of Stylmark Inc. P.O. Box 32008 Minneapolis MN 55432, Phone: (800) 328-2495, Fax: (763) 574-1415 or approved equal.
1. Top channel: #110360 5/8" x 2" for 1/2" glass
 2. Bottom channel: #110361 5/8" x 1" for 1/2" glass.
 3. Clear Anodized Finish: Provide NAAMM AA-M12C22A31, Class I (mechanical finish, non-specular as fabricated; chemical etch, medium matte; Anodic Coating: Architectural Class I clear coating 0.018 mm or thicker) complying with AAMA 607.1
 4. Vinyl glazing bead: #226013
 5. Rubber setting blocks: #226015 5/8" x 1/4"
 6. Provide fasteners of nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components. Install in accordance with manufacturer's instructions.
- C. Unless factory glazing is provided, elastic glazing compound shall be Pecora Chemical Company Challen Glazing Compound M-251, or equal products of Tremco or DAP. Butyl tape shall be Tremco Polyshim Tape.

3PART III EXECUTION

3.01 GLAZING:

- A Bottom of glass shall be set on wood or plastic setting blocks and similar spacers shall be used at vertical edges of glass to maintain proper clearance from metal and wood frames.

- B In hollow metal glass window frames and doors, bed glass in elastic glazing compound to prevent rattling and carefully install removable metal glazing beads. On exterior doors and windows, back-putty glazing bead to insure watertightness.
- C Glazing shall not be done when temperature is below 40° F. Sash and frames shall be dry and free from dust when glazed. Remove all excess glazing compound and stains from sash, frames and glass immediately after glazing.
- D Glazing procedures shall conform to recommendations outlined in the Glazing Manual of the Flat Glass Marketing Association. Basic points of good practice shall include: clean cut edges, no nipping or seamed edges, edge openings in a true plane, and resilient setting blocks at quarter points.
- E Seal joints between pieces of butt-jointed glass with clear silicone sealant similar and equal to GE Silicone Sealant RVT108 or Tremco Spectrem 2.

3.02 GLASS BREAKAGE:

- A Replace all breakage caused in executing the work or by faulty installation. Improperly set glass or glass which does not fully meet the requirements for its grade will not be accepted. At completion of work, glass shall be whole and free from cracks, scratches, and rattles.

3.03 CLEANING:

- A Just before final inspection of the building, clean and wash glass and remove all labels.

End of Section

SECTION 09 22 16 - METAL SUPPORT SYSTEMS

1PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials and equipment, and supervision to provide and install light gauge metal framing.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section	05 40 00	Cold Formed Metal Stud Framing and Sheathing
Section	07 21 00	Building Insulation
Section	09 29 00	Gypsum Wallboard

1.03 QUALITY ASSURANCE:

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2PART II PRODUCTS

2.01 MATERIALS:

A. NON-LOAD-BEARING STEEL FRAMING, GENERAL:

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - a. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - b. Protective Coating: ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized, unless otherwise indicated.
3. Studs: ASTM C 645; 25 ga. Min.
 - a. Framing supporting cement board backer systems shall be 20 ga. Min.
4. Ceiling support systems: Size components to comply with ASTM C 754.
2. Deflection Track: Galvanized steel sheet deep leg track complying with ASTM A-653. Provide "SLP-Trk" by Sliptrack Systems, Inc., "Deep Leg Track w/Slip Clip" by Fire Trak Corp., "Deflection Track" by Marino/Ware or "VertiClip SLD" series by Steel Network Inc.

- B Steel Studs and Runners – 1-5/8", 3-5/8" and 6"

- C 25 Gage Metal Furring Channel

- D Metal Furring Channel Clip

- E 1-1/2" Cold-rolled Channels

- F RC-1 Resilient Channel.
- G Galvanized Hanger Wire: 8-ga. and 12 ga.
- H Galvanized Tie Wire: 18-ga.
- I Fasteners: 3/8" Type S, pan head; 3/8", 1/2" Type S-12, pan head; 5/8" Type S-12 low-profile head; 1", 1-1/4", 1-5/8", 1-7/8", 2-1/4" Type S, bugle head; 1", 1-5/8", 2-1/4" Type S or S-12 trim head.
- J. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: 0.0179 inch (0.45 mm).
 - 2. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.
 - a. Depth: 1-1/2 inches (38.1 mm).
 - b. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.

2PART III EXECUTION

2.01 PARTITION INSTALLATION:

- A Attach steel runners at floor and roof where full height partitions are required or floor where partitions extend only thru ceilings, with suitable fasteners located 2" from each end and spaced 16" o.c.
 - 1. If top track of partition is secured to roof deck, provide "deflection track" with 2 inch flange and install continuous bridging within 1 ft. of track. Do not attach stud to deflection track.
 - 2. Do not bridge building expansion joints with metal stud support system.
 - 3. Where studs or furring are installed directly against exterior walls and a possibility of water penetration through walls exists, install asphalt felt strips between studs and wall surfaces.
- B Position studs vertically, with open side facing in same direction, engaging floor and ceiling runners, and spaced 16" o.c. Provide positive attachment between both flanges of runners and studs. When necessary, splice studs with 8" nested lap and two positive attachments per stud flange. Place studs in direct contact with all door frame jambs, abutting partitions, partition corners and existing construction elements.
- C Anchor all studs adjacent to door and window frames, partition intersections, corners and free-standing furring to structure and floor runner flanges with USG Metal Lock Fastener tool or screws. Securely anchor studs to jamb and head anchors of door or borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flange bend at each end, and secure to strut-studs with two screws in each bent web. Position a cut-to-length stud (extending to roof or floor deck above), unless otherwise noted, at vertical panel joints over door frame header. Use 3 358ST25 and 358CR25 around all openings.
- D Furr out around any pipes, electrical conduit, electrical panels, structural steel, etc. that won't fit into the wall whether or not shown on the drawings.
- E Coordinate with Plumbing, Mechanical, Electrical, and Communications Subcontractors to build-in required blocking for wall mounted equipment and devices.

2.02 CEILING INSTALLATION:

- A Space 8-ga. hanger wires 48" o.c. along carrying channels and within 6" of ends of carrying-channel run. In concrete, anchor hangers by attachment to reinforcing steel, by loops embedded at least 2" or by approved inserts. For steel construction, wrap hanger around or through beams or joists.
- B Install 1-1/2" carrying channels at 48" o.c., and within 6" of walls. Position channels for proper ceiling height, level, and secure with hanger wire saddle-tied along channel. Provide 1" clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12" and secure each end with double-strand 18-ga. tie wire.
- C Erect metal furring channels at right angles to 1-1/2" carrying channels or main supports. Space furring 16" o.c. and within 6" of walls. Provide 1" clearance between furring ends and abutting walls and partitions. Secure furring to carrying channels with clips or wire-tie to supports with double-strand 18-ga. wire. At light troffers or any openings that interrupt the carrying or furring channels, install additional cross reinforcing to restore lateral stability of grillage.
- D Furr out around any pipes, electrical conduit, electrical panels, structural steel, etc. that won't fit above the ceiling, or are exposed in rooms not indicated to receive a ceiling, whether or not shown on the drawings.
- E Coordinate with Plumbing, Mechanical, Electrical, and Communications Subcontractors to build-in required blocking for ceiling hung equipment and devices.

End of Section

SECTION 09 29 00 - GYPSUM WALLBOARD

PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials and equipment, and perform all work to install Gypsum Wallboard exposed ceilings, furr-downs and wallboard, including all miscellaneous trim and accessories as required for a complete installation.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements apply to the work under this section.

Section	09 22 16	Metal Support Systems
Section	06 10 00	Rough Carpentry
Section	07 92 00	Caulking and Sealants
Section	09 91 00	Painting

1.03 SUBMITTALS:

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, component details and attachments to other units of Work.
- C. Textured Finish Samples: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.04 QUALITY ASSURANCE:

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by independent testing and inspecting agency acceptable to authorities having jurisdiction. Fire-Resistance-Rated Assemblies are indicated on drawings by design designations from UL's "Fire Resistance Directory."
- B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
 - 1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.06 PROJECT CONDITIONS:

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART II PRODUCTS

2.01 MANUFACTURERS:

- A. Materials shall be products of United States Gypsum Company as listed or equal products of CertainTeed Gypsum, Georgia-Pacific, Lafarge North America, National Gypsum Company, or equal product of other manufacturers approved prior to bidding, except as specifically noted otherwise.

2.02 GYP SUM BOARD AND ACCESSORIES:

- A. Fire rated Gypsum Board shall be fire-rated 5/8" thick, Type "X" Gypsum panels, unless otherwise noted on the drawings. Non Fire-rated wallboard shall be 5/8" thick Gypsum panels unless otherwise noted. All wallboard shall be 4'-0" wide and most economical lengths to suit building conditions. Ceilings shall receive 5/8" Gypsum panels unless otherwise notes.
- B. Abuse resistant Gypsum Board shall be similar and equal to 5/8 inch thick Fiberock® abuse resistant panels as manufactured by United States Gypsum Company as listed or equal products of Georgia-Pacific, Lafarge North America, Gold Bond Building Products, the Flintkote Company, Bostwick, or Allied Structural Industries, except as specifically noted otherwise
- C. Accessories:
1. Cornerbeads for all external corners shall be USG Dur-A-Bead No. 103 (1-1/4" x 1-1/4").
 2. Metal trim for edges of wallboard abutting masonry, plaster or metal wall surfaces shall be USG No. 200-A.
 3. Control Joint Trim shall be zinc control joint USG No. 093.
- D. Materials for exposed joint treatment shall be USG Perf-A-Tape Dura-bond Compound Taping, Dura-bond 90 Joint Compound, and USG Ready-mixed Joint Compound Topping.
- E. Wallboard in Toilets and elsewhere as noted on the drawings shall be paperless gypsum board similar and equal to 5/8 inch thick DensArmor Plus® panels as manufactured by Georgia Pacific Corporation as listed or equal products of CertainTeed Gypsum, U S Gypsum Co., Lafarge North America, National Gypsum Company, or equal product of other manufacturers approved prior to bidding, except as specifically noted otherwise. Use Finish level 5 on all paperless gypsum board installations.
1. Thickness: 5/8 inch.
 2. Width: 4 feet.
 3. Length: 8 feet.
 4. Weight: 2570 pounds per M square feet.
 5. Edges: Tapered.
 6. Surfacing: Coated glass mat on face, back, and long edges.
 7. Flexural Strength, Parallel (ASTM C473, ASTM C1396): Not less than 100 lbf.
 8. Flexural Strength, Perpendicular (ASTM C473, ASTM C1177): Not less than 140 lbf.
 9. R-Value (ASTM C518): Not less than 0.67.
 10. Nail Pull Resistance (ASTM C473, ASTM C1177): Not less than 90 lbf.
 11. Humidified Deflection (ASTM C79, ASTM C473 and ASTM C1177): Not more than 1/8 inch.
 12. Hardness, Core, Edges, and Ends (ASTM C473, ASTM C1396): Not less than 15.
 13. Water Absorption (ASTM C473, ASTM C630 and ASTM C1396): Less than 5% of weight.
 14. Mold Resistance (ASTM D3273): 10, in a test as manufactured.

2.03 CEMENTITIOUS BACKER UNITS:

- A. Provide cementitious backer units complying with ANSI A118.9 in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8 inch .
2. Width: Manufacturer's standard width, but not less than 32 inches (813 mm).

B. Acceptable Products:

1. C-Cure; C-Cure Board 990.
2. Custom Building Products; Wonderboard.
3. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
4. USG Corporation; DUROCK Cement Board.
5. National Gypsum Co.; PermaBase.
6. Equal product of other manufacturer approved prior to bidding.

C. Fasteners

1. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and application.
2. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: DUROCK Brand Steel or USG Sheathing SF steel drill screws 1-1/4 inch with corrosion-resistant coating.
 - a. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
 - b. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

2.04 ACOUSTICAL SEALANT

- A. Provide nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90: Subject to compliance with requirements, acceptable include:
1. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
 2. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
 3. Additional alternate products must be approved by Architect prior to bidding.

2.05 TEXTURE FINISHES:

- A. Products: Subject to compliance with requirements, provide one of the following where noted on the drawings:
1. G-P Gypsum Corp.; GyProc Vermiculite Ceiling Texture.
 2. United States Gypsum Co.; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).
- B. Primer: As recommended by textured finish manufacturer.
- C. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
- D. Texture: Spatter knock-down.

2.06 AUXILIARY MATERIALS:

- A. Isolation strip at exterior walls: Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

PART III EXECUTION

3.01 INSTALLATION - GENERAL:

- A. The installation of Gypsum board shall conform to applicable provisions of Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216, the recommended specifications of the Gypsum board manufacturer and to underwriter's laboratory. Refer to UL Assembly installation requirements at fire-rated partitions.
- B. At all fire-rated partitions the wallboard shall extend to the roof deck above. At all non-rated partitions the wallboard shall extend to a minimum of 6 inches above the ceiling.
- C. Where fixtures or accessories are recessed into rated partitions, take caution and do work necessary to maintain the fire rating of the partition.
- D. Apply W/R sealant to all cut or exposed edges of W/R panels prior to installing.
- E. Furr out around Columns, and thicken partitions at electrical panels, alarm panels, columns, piping ductwork and other items as required.
- F. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- G. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- H. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- I. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- J. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- K. Attach gypsum panels to framing provided at openings and cutouts.
- L. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members using resilient channels, or provide control joints to counteract wood shrinkage.
- M. Form control and expansion joints with space between edges of adjoining gypsum panels.
- N. Fit gypsum panels around ducts, pipes, and conduits.
- O. 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 3/8-inch-wide joints to install sealant.
- P. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4 to 1/2-inch-wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- Q. Floating Construction: Where feasible, including where recommended in writing by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.

- R. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
- S. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
- T. Apply Gypsum panels parallel to studs, perpendicular to resilient channels. Position all edges over studs. Fit ends and edges closely, but not forced together. Stagger joints on opposite sides of partition. Fasten panels to studs with 1" Type S Bugle Head Screws 8" on center at vertical joints, in field, and to door head and ceiling runners.
- U. Power drive at least 3/8" from edges and ends of gypsum panels to provide uniform 1/32" dimple.

3.02 PANEL APPLICATION METHODS:

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels perpendicular to framing, unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
3. Stagger abutting end joints not less than one framing member in alternate courses of board.
4. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
5. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
6. Fastening Methods: Apply gypsum panels to supports with steel drill screws. For exterior applications, use corrosion-resistant screws.

B. Multi-Layer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Method: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners unless specified assembly requires fastening base layers and face layers separately to supports with screws.

- C. Laminating to Substrate: Where gypsum panels are indicated to be directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Partitions:

1. Install panels horizontally and unbroken, to extent possible, across curved surface plus 12-inch (min.) long straight sections at ends of curve which continue tangent to curve.
2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.
3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels to framing with screws spaced 12 inches o.c. max.
4. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. (max.) Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c. (max.)
5. Allow wetted gypsum panels to dry before applying joint treatment.

3.03 CEMENTITIOUS BACKER BOARD INSTALLATION:

- A. Install as indicated to comply with ANSI A108.11 and in accordance with manufacturer's instructions.
- B. Complete plumbing rough-in before boards are erected.
- C. Separate board from rough-in and fixtures and fill space as recommended by manufacturer.
- D. Securely fasten boards to substrate as required.
- E. Follow manufacturer's instructions for treatment of edge terminations.
- F. At joints and corners, embed fiberglass tape in skim coat of mortar.

3.04 INSTALLING TRIM ACCESSORIES:

- E. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- F. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect. Provide gypsum board backing at control installed in fire rated partitions in accordance with manufacturer's recommendations and as required to maintain the rating specified. Install control joints in the following locations if not specifically located on the drawings:
 1. In partition or furring runs at 30 feet on center maximum.
 2. In ceilings where dimensions exceed 30 feet in either direction maximum.
 3. In ceilings at ridge lines or at change of slope.
 4. In exterior gypsum board soffits that exceed 30 feet in either direction maximum.
 5. Where wings of "L", "U", and "T" shaped ceiling areas are joined.
 6. Expansion or control joints that occur throughout the building itself.
 7. Less-than-ceiling height door and window frames should have control joints extending to the ceiling from both corners. Ceiling height door and window frames may be used as control joints.
 8. Install backer rod and sealant behind control joints in wall noted on the drawings to contain sound insulation or to include resilient channels in the wall assembly.
- G. Cornerbeads shall be installed at all exterior corners attached with screws or 9/16" rosin-coated staples 9" o.c. Cornerbeads shall be in single lengths except where corner exceeds standard stock lengths. Clinch-on cornerbeads shall not be allowed.

- H. Casing beads shall be installed where gypsum board abutts masonry walls.

3.05 APPLYING TEXTURE FINISHES

- I. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- J. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- K. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture finish manufacturer's written recommendations.

3.06 FINISHING GYPSUM BOARD ASSEMBLIES:

- L. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- M. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- N. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- O. In sanding jointing compound, care shall be taken not to sand exposed face of gypsum board and raise a knap on the paper covering.
- P. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
1. Level 1: Embed tape at joints. **Use this finish level in ceiling plenum areas not exposed to view, concealed areas, and elsewhere as indicated.**
 2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners and trim flanges. **Use this finish level where panels are substrate for tile and elsewhere as indicated.**
 3. Level 3: Embed tape and apply separate first and fill coats of joint compound to tape, fasteners, and trim flanges. **Use this finish level where indicated.**
 4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. **Use this finish level at panel surfaces that will be exposed to view or covered with flexible wall coverings unless otherwise indicated.**
 5. Level 5: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface. **Use this finish level at panel surfaces to be painted with semi-gloss or gloss paint.**

3.07 PROTECTION:

- A. During Gypsum panel application and joint finishing, temperatures within the buildings shall be maintained within the range of 55°F to 70°F. Adequate ventilation shall be provided to carry off excess moisture.

- B. All materials shall be delivered to the buildings in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements. Damaged or deteriorated materials shall be removed from the premises.

3.08 CLEANUP:

- A. Upon completion of work, remove all drywall debris and scrap materials from the premises and site.

End of Section

SECTION 09 51 13 – ACOUSTICAL TREATMENT

1PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, equipment and supervision necessary to provide and install suspended acoustical tile and grid where scheduled on the drawings.

1.02 GENERAL:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit shop drawings.
- B Submit samples of tile and sections of suspension system.

2PART II PRODUCTS

2.01 MATERIALS:

- A Tile shall be as scheduled on the Drawings.
 - 1. If Tile is not scheduled on the Drawings, tile shall be Fine Fissured, Second Look Two™ No. 1761 24" x 48" x 3/4" Lay-in as manufactured by Armstrong Cork Company, or approved equals of National Gypsum, Conweb, Celotex, or U.S. Gypsum.
- B Suspension system shall be as scheduled on the Drawings.
 - 1. If Suspension system is not scheduled on the drawings system shall be: Double-webb, direct hung system complying with ASTM C-635 similar and equal to Donn DX system by USG Interiors Inc.
 - 2. Classification: Intermediate duty.
 - 3. Metal: Electro-galvanized steel 0.015 inch thick x 1-1/2 inch high x 15/16 inch face.
 - 4. Color: White
- C Hanger Wire: Provide not less than 12 gage galvanized carbon steel ASTM A641, soft temper.
- D Edge Moldings and trim: Manufacturer's standard metal of types and profiles required for all applications encountered. Fabricate to fit all penetrations exactly.
- E Drop ceiling trim shall be "Compasso 4" trim as manufactured by U.S. Gypsum or equal of Armstrong Cork Co. or approved substitute.
- F Ceiling tile hold down clips shall be similar and equal to Donn Q-1 for use as required at Fire rated assemblies and at entries as shown on the drawings.
- G Plastic grid clips shall be similar and equal to Part # 107015 as manufactured by K International, Inc., 3982 Ryan Rd., Gurnee, IL 60031, 800-323-2389. Provide a minimum of eight (8) for each room designated as an "E" occupancy on the Life Safety drawing. Provide a minimum of four (4) for each room designated as a "B" occupancy on the Life Safety drawing.

3PART III EXECUTION

3.01 INSTALLATION:

- A Installation shall be by distributor authorized by the manufacturer of the tile in accordance with published recommendations and approved drawings. Provide all edge moldings, clips and related accessories.
- B Cooperate and coordinate installation with electrical and mechanical trades, regarding light fixtures, diffusers, and other equipment.
- C Install systems in compliance with ASTM C636, governing regulations and fire-resistance requirements. Support hangers only from structural members. Locate hangers not less than 6 inches from each end and spaced 4 feet on center along main runner. Level to within 1/8 inch in 12 feet. Limit deflection to 1/360 of span length in inches.
- D Install hangers plumb and free from contact with objects which are not part of structural or ceiling system. Wire connections shall be capable of supporting a 100 pound allowable load.
- E Provide main runners continuous in line with each side of recessed lights. Entire suspension system shall be completely connected forming a homogeneous frame. Independent/unattached fields are prohibited.
- F Provide trim and moldings as required to conceal edges of acoustic tiles.
- G Install panels to fit accurately at borders and penetrations.
- H Suspended ceiling system shall not be used to support ductwork, piping, insulation, etc.

3.02 ADDITIONAL INSTALLATION REQUIREMENTS:

- A General: Comply with requirements of authority having jurisdiction in the respective seismic zone.
- B Individual light fixtures or other attachments to the ceiling system, with a combined weight of 56 pounds or less shall have two 12 gage wire hangers attached, with slack, at diagonal corners of the fixture to prevent drop out.
- C Any fixture or attachment weighing more than 56 pounds must be independently supported from the structure.
- D The minimum connection strength for main and cross runner intersection/splices shall be 60 pounds. In compression and tension (must allow 5 degree offset in any direction).
 - 1. Ceiling system actual weight, including grid, panel, light fixtures and air terminals to be 2.5 pounds per sq. ft. or less. All other services shall be independently supported from the structure.
- E The ceiling system cannot be used to provide lateral support for walls or partitions.
- F Perimeter closure angles must provide a min 7/8 inch support ledge. Terminal ends of grid or tile must rest on ledge with min 3/8 inch clearance from wall:
 - 1. For support ledges smaller than 7/8 inch, terminal ends of cross or main runners shall be independently supported within 8 inches from each wall or ceiling discontinuity. This

support must prevent grid from falling. This support should not be out of plumb greater than 1 in 6. Maintain 3/8 inch end clearance from wall.

2. All penetrations (i.e. columns, sprinklers, etc.) and independently supported fixtures are considered perimeter closures that must allow noted clearances.

G At wall Closure ledges, cross and main runners must be prevented from spreading apart. Permanent attachment for grid alignment purposes is prohibited.

3.03 ADJUST AND CLEAN:

A Clean exposed surfaces of panels, moldings, and trim. Remove and replace work which cannot be cleaned to permanently eliminate evidence of damage.

3.04 ATTIC STOCK:

A Contractor shall furnish 5% extra ceiling tile for each type used in this project.

B Extra tile shall be packaged and marked as to type and furnished to the Owner at the completion of the project.

3.05 CLEAN-UP:

A Remove all debris after tile work is complete in each space.

End of Section

SECTION 09 53 13 - CURVED PROFILE CEILING SUSPENSION ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal ceiling panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:

1. Section 09 51 00 (09510) – Acoustical Ceilings
2. Section 09 20 00 (09250) – Plaster and Gypsum Board
3. Divisions 23 (15) – HVAC
4. Division 26 (16) Sections - Electrical Work

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM A 1008 "Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability"
4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E 1264 Classification for Acoustical Ceiling Products.
8. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- B. Samples: Minimum 3 inch x 3 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items that are to be coordinated with, or supported by the ceilings.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
 - a. Flame Spread: 25 or less
 - b. Smoke Developed: 50 or less
- C. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle ceiling units carefully to avoid any distortion or damaged units in any way.

1.7 PROJECT CONDITIONS

- A. Space Enclosure:

HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.8 WARRANTY

- A. Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:
 - 1. Panels: Sagging and warping
 - 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
 - 1. Panels: Thirty (30) years from date of substantial completion.
 - 2. Grid: Thirty (30) years from date of substantial completion.

3. Panels and grid systems with HumiGuard Plus performance supplied by one source manufacturer is fifteen (15) years from date of substantial completion.
- C. The 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.

1.9 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
 1. Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Metal Panels:
 1. Armstrong World Industries, Inc.
- B. Suspension System:
 1. Armstrong World Industries, Inc.

2.2 METAL ACCENT CLOUD PANELS

- A. Panels Type ACT-1:
 1. Patterns: (8 perforation options and un-perforated)
 2. Composition: Aluminum panels
 3. Color: 13 standard color options with custom colors available
 4. Size: 24 inches wide; lengths 4 feet to 12 feet (in 2 foot increments)
 5. Edge detail: Concealed grid components with 1/4 inch black reveal between panels.
 6. Arc Dimensions: (7.5°) (15°) (22.5°) (30°) (37.5°) (45°) (52.5°) (60°) (75°) (90°)
 7. Flame Spread: Class A as per ASTM E 1264
 8. Acceptable Product: (Serpentina Waves) as manufactured by Armstrong World Industries.
- B. Accessories
 1. Acoustical Fleece laminated backing (white) (black)
 2. Infill Panel (fiberglass infill) #820-01-00

2.3 SUSPENSION SYSTEM

- A. Components: Main beams fabricated from painted commercial quality extruded aluminum; cross tee base metal and end detail are fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Concealed main beams have a 15/16" type flange design.
 1. Color: (Grid Color selected on form) and match the actual color of the selected ceiling tile, unless noted otherwise.
 2. Serpentina Waves vault or hill main beams (4, 6, 8 and 10 foot long) curved to (7.5°) (15°) (22.5°) (30°) (37.5°) (45°) (52.5°) (60°) (75°) (90°) degree arcs, hung 24" or 48" OC; straight main beam options also available for flat ceiling applications.
 3. Semiconcealed Cross Tee (SCST24SPTUD)
 4. Serpentina Waves Connector Sleeves: Slip over flange of main beams:
 - a. 4 foot sleeve (SPTCS4)
 - b. 6 foot sleeve (SPTCS6)
 - c. 8 foot sleeve (SPTCS8)
 - d. 10 foot sleeve (SPTCS10)

- e. 12 foot sleeve (SPTCS12)
- 5. Corner Post (SPTOSCP): Pre-assembled corner
- 6. Cross Tee Connector Clip (AXCCLT): Factory installed twist-in clip with pre-punched holes for attachment of cross tees to perimeter trim.
- 7. Splice Plates (SPTSPLICE): used to align and secure joints between sections of Serpentina Perimeter Trim. One splice plate needed for each joint.
- 8. Serpentina Perimeter Hold Down Clips (AX-SPT-HDC): as needed to maintain contact between panel and trim.
- 9. Strong Back: Used for aid stability and squaring of the system during installation. Also eliminates hanger wires on perimeter cross tees. Note: Hanger wires are still to be attached to the main runners, not the StrongBack.
- C. Edge Moldings and Trim:
 - 1. Serpentina Perimeter Trim (SPT): Cut to size, curved for parallel attachment to main beams and straight for to close off ends.
- D. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- E. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
 - 1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

- A. Install suspension system and panels in accordance with manufacturer's instructions and in compliance with ASTM C 636 and with the authorities having jurisdiction.
 - 1. Serpentina Waves (LA297436)
- B. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.
- C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- D. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 19 – RESILIENT BASE

1PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, equipment and supervision to provide and install vinyl base in areas where indicated on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 PROJECT CONDITIONS:

- A Maintain 70° F. minimum temperature in room for 48 hours prior to installation, during installation, and 48 hours after installation. Maintain a minimum temperature of 55° F. thereafter.

1.04 QUALITY ASSURANCE:

- A Installation shall be by experienced and skilled mechanics, in accordance with the manufacturer's latest printed instructions.
- B Coordinate the requirements of adhesives and finish to assure compatibility between adhesive and wall finish.

1.05 SUBMITTALS:

- A Submit product data, certificates, and maintenance data in accordance with Division 1 requirements. Submit the following:
 - 1. Product data: For each type of product specified.
 - 2. Samples for Selection: In manufacturer's standard size for each product specified.

1.06 GUARANTEE:

- A Furnish to the Owner a written guarantee that all work required by this section will be free from defects of materials and workmanship for a period of one year from date of acceptance of the work by the Architect.

2PART II PRODUCTS

2.01 MATERIALS:

- A Cove Base shall be Thermoset vulcanized Rubber Base manufactured from 100% virgin synthetic rubber as manufactured by Johnsonite, Flexco Roppe, or approved substitute. Provide 1/8" gauge set-on straight base 4 inches high at carpeted floors unless noted otherwise on the drawings. Provide 1/8" gauge set-on cove type, 4 inches high at all other floor surfaces where rubber base is scheduled. Provide base in 120 foot rolls. Colors to be selected by the Owner.
- B Adhesive shall be types specified by the manufacturer. Adhesive for installing base shall be in accordance with manufacturer's written instructions.
- C Provide and install preformed base corners at all inside and outside corners.

3PART III EXECUTION

3.01 INSPECTION:

- A The Contractor shall inspect substrate to receive new work prior to beginning work and shall bring any deficiencies, which would prevent him from producing an acceptable installation to the attention of the General Contractor. He shall not proceed until the deficiencies are corrected. In no case shall the correction of deficiencies in the substrate, required for successful installation, be cause for additional charges to the Owner. In any event, start of work shall be construed by the Owner as acceptance by the Contractor, of the substrate for proper installation.

3.02 PREPARATION OF SURFACES:

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- C. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- D. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3.03 INSTALLATION:

- B Install resilient base at all wall-to-floor connections in which wall or floor has received a new or repaired surface treatment and where indicated on the drawings and around the base of all fixed base cabinets.

3.03 CLEANING AND PROTECTION:

- A Perform the following operations immediately after installing resilient products:
1. Remove and replace all damaged, defective, scratched, and discolored base.
 2. Remove adhesive and other surface blemishes using cleaner recommended by the resilient product manufacturers.
 3. Sweep or vacuum floor thoroughly.
- B Clean according to manufacturer's recommendations.

End of Section

SECTION 09 68 13 – TILE CARPETING

1PART I - GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, transportation, etc., required to provide and install carpet tile over access flooring, as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A. Submit data sheets and indicate quantities required on adhesive, and other accessories. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. Successful bidder, upon request of Architect, shall supply a complete color selection of samples of carpet on which he has based his bid.
- C. Qualification data for proposed installer.
- D. Product Test Reports based on evaluation of comprehensive tests performed by a qualified testing agency.
- E. Maintenance Data for carpet tiles to include maintenance manuals including the following:
 - 1. Method for maintaining carpet tile, including cleaning and stain removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
 - 3. Copy of special warranty specified in this section.

1.04 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.06 PROJECT CONDITIONS:

- A. Maintain 70° F minimum temperature in room for 48 hours prior to installation, during installation, and 48 hours after installation. Maintain a minimum temperature of 55° F thereafter.
- B. Do not install carpet tile until they are at the same temperature as the space where they are to be installed.

- C. Close spaces to traffic during carpet tile installation, and for a time period after installation recommended in writing by the manufacturer.
- D. Install carpet tile and accessories after other finishing operations, including painting, have been completed.
- E. Do not install carpet over access floors until after floor pedestal adhesives have cured and are sufficiently dry to support loading of carpet and installation operations, as determined by floor covering manufacturer's recommendations.

1.07 GUARANTEE:

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
- B. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 1. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, delamination.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

1.08 EXTRA MATERIALS:

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to five percent (5%) of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART II - PRODUCTS

2.01 MATERIALS:

- A. Carpet: Tile shall be as scheduled on the drawings. If carpet tile are not scheduled on the drawing, contractor shall provide an allowance of \$32 per yard for carpet tile in addition to adhesive and other materials necessary for a complete installation.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

PART III - EXECUTION

3.01 INSPECTION:

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. For raised access flooring systems, verify the following:

1. Access floor complies with requirements specified in Division 09 Section "Access Flooring."
 2. Access floor substrate is compatible with carpet tile and adhesive if any.
 3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch (3 mm) protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION:

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.03 CLEANING AND PROTECTION:

- A. Perform the following operations immediately after installing carpet tile:
 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 2. Remove yarns that protrude from carpet tile surface.
 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

End of Section

SECTION 09 77 20 – FRP WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, material, equipment, and supervision necessary to provide and install FRP panels as shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
 - 1. ASTM D 256 - Izod Impact Strengths (ft #/in)
 - 2. ASTM D 570 - Water Absorption (%)
 - 3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
 - 4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
 - 5. ASTM D 2583- Barcol Hardness
 - 6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- C. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
 - 1. Submit complete with specified applied finish.
 - 2. For selected patterns show complete pattern repeat but not less than 4" x 4" in size.
 - 3. Exposed Molding and Trim: Provide samples of each type, finish, and color.

1.05 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with ASTM E 84 (Method of test for surface burning characteristics of building Materials)
 - 1. Wall Required Rating – Class A
- B. Sanitary Standards: System components and finishes to comply with:

1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store panels and trim lying flat, under cover and protected from the elements.
- B. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
- C. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.07 WARRANTY

- A. Provide manufacturer's lifetime limited warranty.

PART 2 - PRODUCTS

2.01 FRP PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319 equal to Standard FRP panels as manufactured by Marlite, 202 Harger Street, Dover, OH 44622. 800-377-1221 or by manufacturer approved by Architect prior to bidding.
 1. Coating: Multi layer print, primer and finish coats.
 2. Dimensions:
 - a. Thickness: 0.090 inch (2.29mm) nominal
 - b. Width: 4'-0" (1.22m) nominal
 - c. Length: As indicated on the drawings. If no lengths are indicated on the drawings, 8'-0" shall be used.
 3. Tolerance:
 - a. Length and Width: +/-1/8 inch (3.175mm)
 - b. Square - Not to exceed 1/8 inch for 8 foot (2.4m) panels or 5/32 inch (3.96mm) for 10 foot (2.4m) panels
 4. Finish:
 - a. Color: As selected by Architect from manufacturer's full range.
 - b. Texture: "Pebbled" unless drawings indicate otherwise
- B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
 1. Flexural Strength - 1.0×10^4 psi per ASTM D 790.
 2. Flexural Modulus - 3.1×10^5 psi per ASTM D 790.
 3. Tensile Strength - 7.0×10^3 psi per ASTM D 638.
 4. Tensile Modulus - 1.6×10^5 psi per ASTM D 638.
 5. Water Absorption - 0.72% per ASTM D 570.
 6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
 7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256

2.02 RELATED MATERIALS

- A. Base: If indicated in drawings, or if no other base is indicated for the Room indicated to receive FRP installation, provide and install Marlite Base Molding for 0.090 inch (2.29mm) thick FRP Panels.
 - 1. Color: As selected by Architect
 - 2. Provide all base molding, corner and cap profiles for a complete installation.
- A. Moldings: Extruded PVC Trim Profiles for .090 inch thick panels.
 - 1. Color: To match panels
 - 2. Provide all corner, division, edge and cap profiles for a complete installation.
- B. Outside Corner Guard: PVC in color to match panels.

2.03 ACCESSORIES

- A. Fasteners: Non-staining nylon drive rivets to match panel colors.
- B. Adhesive complying with ASTM C 557 similar to Marlite C-375 Construction adhesive flexible, water-resistant, solvent based adhesive formulated for fast, easy application.
- C. Sealant matching panel color.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine substrates to ensure corners are plumb, straight, smooth, uniform, clean and substrate is free of foreign matter, nails not countersunk, joints and cracks not filled flush and smooth with the adjoining surface.
- B. Verify that stud spacing does not exceed 24 inch (61cm) on center.
- C. Repair defects prior to installation. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.02 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Cut sheets to meet supports allowing 1/8" inch (3 mm) clearance for every 8 foot (2.43m) of panel.
 - 1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
 - 2. Pre-drill fastener holes 1/8 inch (3.175mm) oversize with high speed drill bit.
 - a. Space at 8 inches (20.32cm) maximum on center at perimeter, approximately 1 inch from panel edge.
 - b. Space at in field in rows 16 inches (40.64cm) on center, with fasteners spaced at 12 inches (30.48 cm) maximum on center.
- C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
 - 1. Install panels with manufacturer's recommended gap for panel field and corner joints.

- a. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
 - b. Drive fasteners for snug fit. Do not over-tighten.
- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
 - 1. All moldings must provide for a minimum 1/8 inch (3.18mm) of panel expansion at joints and edges, to insure proper installation.
 - 2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.03 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
- B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

End of Section

SECTION 09 91 00 - PAINTING

PART I GENERAL

1.01 SCOPE:

- A. Painting is required on all new and existing surfaces unless otherwise scheduled and/or as noted on the drawings and herein as specified.
- B. The term "paint" as used herein is all inclusive, meaning emulsions, enamels, oil paints, sealers, stains, varnishes, polyvinyl emulsions, latex emulsions and similar coatings.
- C. Before any paint material has been delivered to the job, submit a complete list of materials proposed for use, identifying each type of material by manufacturer's brand name, and no material shall be delivered to the job until the Architect's approval has been secured in writing. Approval will be of brands and quality, but not for results obtained.
- D. Painting will not be required on non-ferrous metal, putty, or glazing compound, masonry with integral color, or on factory finished items including prefinished cabinet work, equipment and galvanized wirework, except as may be specifically required elsewhere in the specifications.
- E. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- F. Conditions of Surfaces: It shall be the responsibility of each subcontractor to carefully inspect and examine surfaces or areas prepared to receive his work. Should he consider such surfaces or areas not proper or satisfactory for the installation or application of his work, he shall notify the Contractor in writing with copy to the Architect. Should he proceed before proper corrections have been made, it shall be at his own risk and any subsequent corrections that may be ordered or required shall be at his expense.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
- B. See Section 092900 Gypsum Wallboard for finish requirements for prime coat on Paperless Gyp. Bd.

1.03 DEFINITIONS:

- A. Flat: lusterless or matte finish with gloss range below 15 when measured at 85-degree meter.
- B. Eggshell: low-sheen finish with gloss range 5 to 20 when measured at 60-degree meter.
- C. Semi gloss: medium-sheen finish with gloss range 30 to 65 when measured at 60-degree meter.
- D. Full gloss: high-sheen finish with gloss range more than 65 when measured at 60-degree meter.

1.04 SUBMITTALS:

- A. Submit manufacturer's data including label analysis and instructions for handling, storing, and applying each material proposed for use. Include block fillers and primers.
- B. Provide certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- C. Where substitutions are approved, submit manufacturer's color charts for color selection.
- D. Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate if required by the Architect.

1.05 QUALITY ASSURANCE:

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Obtain primers, block fillers and undercoat paint for each system from same manuf. as finish coats.
- C. Provide primers compatible with finish system in strict accordance with manufacturer's recommendations. Upon request, furnish data for characteristics of finish materials to ensure compatible prime coats are used.
- D. Notify the Architect of problems anticipated using the materials specified.
- E. Provide the manufacturer's best quality paint material for each coating type specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- F. Proprietary names used to designate colors or materials are not intended to imply that products named are required, or to exclude equal products of other manufacturers.
- G. No claim by the Contractor concerning the unsuitability of any material specified or his inability to produce satisfactory results therewith will be considered unless such claim is made in writing to the Architect before the Contract is signed.
- H. The Architect will select one room or surface to represent surfaces and condition for each type of coating and substrate to be painted, demonstrating finished colors textures. Final acceptance of colors will be given based on job-applied samples. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45° F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
- C. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.07 EXTRA MATERIALS:

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory- sealed containers for storage and identify with labels describing contents. Deliver extra materials to owner at close of Project.
- B. Furnish Owner with additional 5 percent, but not less than 1 gal of each material & color applied.

1.08 JOB CONDITIONS:

- A. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are 50° F -90° F.

- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are 45° F -95° F.
- C. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, at temperatures less than 5° F (3° C) above the dewpoint, or to damp or wet surfaces.
- D. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

PART II PRODUCTS

2.01 MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.
- B. Manufacturer's Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
 - 1. PPG Industries, Inc. (PPG).
 - 2. Sherwin Williams (SW).
 - 4. Comex Group (CW).

2.02 PAINT:

- A. Paint shall be ready-mixed, except that tinting and thinning may be done at the job. The paint shall be suitable for spraying when thinned by not more than 12 percent by volume of thinner. All paint materials shall be delivered in original unopened containers with labels intact and legible.
- B. Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- C. Provide manufacturer's best-quality paint material of the various coating types specified. Paint- material containers not displaying manufacturer's product identification will not be acceptable.
- D. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- E. Colors: Match colors indicated by reference to manufacturer's color designations.

2.03 COLORS AND SPECIMENS FOR APPROVAL:

- A. Colors and finishes shall be as indicated on the drawings. If not scheduled on the drawings, colors shall be as selected by the Architect. Before any work is done, the Architect will furnish the Contractor with a set of color cards and a schedule showing where the various colors shall go. The Contractor shall then prepare samples at the job as required until the colors and textures are satisfactory. Wood used to display stains shall be the same kind on which the stain is to be used.
- B. The Contractor, if requested by the Architect, shall finish one complete room, space, or item, for each color scheme or finish required, showing selected colors, finished texture, materials and workmanship. After approval, these sample rooms or items shall serve as standard for similar work throughout the building.

PART III EXECUTION

3.01 EXAMINATION:

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

- B. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
- C. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.02 GENERAL REQUIREMENTS:

- A. Maintain temperature of rooms where varnish or enamel is being applied at 70 degrees or more, and at 50 degrees or more during other interior painting. Do exterior painting only when temperature is 50 degrees or higher, and in dry weather.
- B. Apply all materials under adequate illumination, evenly spread and smoothly flowed on without runs or sags. Only skilled workmen shall be employed.
- C. Vary tints of succeeding coats slightly to permit identification of coats.
- D. If any paint is applied to damp material or improperly prepared surfaces; the Contractor shall use such corrective measures as determined by the Architect.
- E. Protect all adjacent work and materials by suitable covering, or other methods, during progress of the work. Upon completion, remove all paint spots from floors, glass and other surfaces.
- F. Store and mix paint materials only in spaces designated and assigned for the purpose. Do not permit paint or oil soaked rags or waste to accumulate. Exercise strict precautions at all times against fire.
- G. Side edges of wood doors shall be finished same as faces. Top and bottom edges shall have adequate sealer coatings applied immediately after fittings.
- H. Covering shall be complete. When color, stain, dirt, or undercoats show through the final coat of paint, apply additional coats until the finish is of uniform color and appearance and coverage is complete.
- I. Paste wood filler, when set, shall be wiped across the grain, then with the grain, to secure a clean surface.
- J. Enamel, varnish, or oil finish applied to wood or metal shall be sanded between coats with fine sandpaper to produce an even, smooth finish.
- K. Before painting, remove hardware, accessories, plates, lighting fixtures and similar items, or provide ample protection for such items. Upon completion of each space, replace above items. Remove doors, if necessary, to paint bottom edge. Use only skilled workmen for removing and connecting above items.
- L. Paint all new exterior wood.
- M. Paint all interior wood.
- N. Paint all new metal structure exposed in interior of building.
- O. When painting existing surfaces or new work cut into existing surfaces, new paint coverage shall extend corner to corner and floor to ceiling covering the entire plane of the surface in question.

3.03 PREPARATION OF SURFACES:

- A. Wood surfaces shall be sandpapered to a smooth and even surface and dusted off. After priming or stain coat has been applied, thoroughly fill nail or other holes and cracks with plastic wood or putty; for natural finish work, filler (if required) shall be colored to match wood.
- B. On metal surfaces, remove grease, rust, scale and dust, and touch up any abraded place on items that have been shop coated. Where steel or iron has a heavy coating of scale, it shall be removed by wire-brushing or sandblasting as necessary to produce satisfactory painting surface.
- C. Chemically treat galvanized metal surfaces with a compound for this purpose, in accordance with the manufacturer's directions for use, before applying the first coat of paint.

- D. Concrete block surfaces: Wire brush to remove loose materials.
- E. Exposed concrete: Wire brush to remove loose mortar. Patch and repair surfaces for uniform texture.
- F. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
- G. Backpriming: All concealed surfaces of painted wood shall be backprimed. Spot prime all ends of trim.
- H. Touch up bare areas of shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
- I. Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- J. Between coats of polyurethane prime coat rub with steel wool and allow overnight drying.

3.04 PROTECTION:

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by the Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- C. At completion of construction activities of other trades, touch and restore damaged or defaced painted surfaces.

3.05 CLEANING:

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
- B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.06 SCHEDULE OF PAINTING:

GENERAL:

- 1. All items listed in the following paint schedule may not apply to this project.
- 2. Numbers of coats listed in this schedule are minimum. If coverage is not complete and uniform, additional coats must be added until the finished surface is satisfactory and accepted by the Architect.
- 3. Omit primer on metal surfaces that have been shop primed and touch-up painted.
- 4. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- 5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- 6. Electric Panel Boxes: Two (2) coats Rustoleum over prime coat.
- 7. Exposed Pipe, Pipe Hangers, Sprinkler Pipe, Sprinkler Pipe Hangers, Supports etc.: Two (2) coats satin enamel over metal primer.
- 8. Exposed Ductwork: Two (2) coats satin enamel over one (1) coat metal primer for galvanized.

9. Wood Doors Not Factory Finished: Stain followed by one (1) coat sealer primed followed by two (2) coats satin-clear varnish.
10. Specific finishes listed in the finish schedule on the drawings take precedence over the finishes listed below. Luster levels indicated or scheduled on drawings shall take precedence over those specified below. If they differ, provide like product below in luster indicated on drawings.

B. EXTERIOR:

1. Metal: Provide the following finish system over miscellaneous ferrous metal, structural, hollow metal doors and frames, louvers:

Semi gloss, Acrylic-Enamel Finish: Two (2) finish coats over a rust-inhibitive primer:

Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils:

PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.

SW: DTM Acrylic Primer/Finish, B66W1 (OR) Kem Kromik Universal Metal Primer, B50Z (Alkyd).

CW: C309 Ultra Teach DTM Universal Water-Based Metal Primer

First and Second Coats: Semi gloss, exterior, acrylic –latex enamel applied at spreading rate recommended by manuf. to achieve total dry film thickness of not less than 2.6 mils.

PPG: 78 Line Sun-Proof Semi-Gloss House and Trim Paint.

SW: A100 Exterior Acrylic Gloss A8 Series or Metalatex Exterior Semi-gloss Coating, B42-100.

CW: C218 Ultra Tech Exterior 100% Acrylic Semi-Gloss Coating

2. Non-Ferrous Metal: Galvanized. (Acid etch galvanized surfaces that have not weathered at least six months prior to beginning painting operations). Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

Semi gloss, Acrylic-Enamel Finish: Two (2) finish coats over a galvanized metal primer.

Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

ICI: 4020 Devflex DTM; Flat Int./Ext. Waterborne Primer /Finish.

PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.

SW: DTM Acrylic Primer/Finish, B66W1.

CW: C309 Ultra Teach DTM Universal Water-Based Metal Primer

First and Second Coats: Semi gloss, exterior, acrylic-latex enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.6 mils.

PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.

SW: A100 Exterior Acrylic Gloss A8 Series (OR) Metalatex Exterior Semi-gloss Coating, B42-100.

CW: C218 Ultra Tech Exterior 100% Acrylic Semi-Gloss Coating

3. Aluminum surfaces in contact with masonry or steel to have a coat of zinc chromate.
4. Smooth Wood and PVC pipe columns: Provide the following finish systems over smooth wood siding and other smooth, exterior wood surfaces:

Semi gloss, Acrylic-Enamel Finish: Two (2) finish coats over a primer.

Primer: Exterior, alkyd or latex wood primer, as recommended by the manufacturer for this substrate, applied at a spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

PPG: 72-1 Sun-Proof Exterior House & Trim Wood Primer-Flat Latex.

SW: (Wood) A100 Exterior Latex Primer, B42W41; (PVC) PrepRite Bonding Primer, B51W50.

CW: 330 Optima All Prime Acrylic

First and Second Coats: Semi gloss, waterborne, exterior, acrylic enamel applied at a spreading rate recommended by the manuf. to achieve a total dry film thickness of not less than 2.4 mils.
PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
SW: A100 Exterior Acrylic Gloss A8 Series (OR) Metalatex Exterior Semi-gloss Coating, B42-100.
CW: C218 Ultra Tech Exterior 100% Acrylic Semi-Gloss

5. GFRC fabrications, Fiber-cement Siding and Trim: Provide the following finish systems over fiber-cement siding and trim surfaces:

Semi-Gloss, Acrylic-Enamel Finish: Two (2) finish coats over a primer.

Primer: Exterior, Alkali Resistant 100% Acrylic primer, as recommended by manufacturer for this substrate, applied at a spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2 mils.
PPG: 4-603 Interior/Exterior Alkali Resistant Primer-Non Flat Acrylic.
SW: Loxon Exterior Alkali-Resistant Primer – Flat Acrylic
CW: 335 Tropicoat Masonry Alkali-Resistant Primer

First and Second Coats: Semi gloss, waterborne, exterior, acrylic enamel applied at a spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.4 mils.
PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
SW: A100 Exterior Acrylic Gloss A8 Series (OR) Metalatex Exterior Semi-gloss Coating, B42-100.
CW: C218 Ultra Tech Exterior 100% Acrylic Semi-Gloss

6. Concrete Block: Provide the following finish over exterior concrete masonry units:

Flat Smooth Elastomeric Coating: Two (2) finish coats over block filler.

Block Filler: High-performance, latex block filler applied a spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 9.0 mils.
PPG: 4-100 Pittblock LTC Acrylic Block Filler.
SW: Heavy Duty Block Filler, B42W46 or Loxon Block Surfacer A24W2W.
CW: 3250 Hi-Build Block Filler (OR) 1240 Flex Lox High Build

First and Second Coats: Flat, exterior, Smooth Elastomeric Coating applied at spreading rate recommended by manufacturer to achieve total dry film thickness of less than 12 mils.
PPG: 4-110 Acrylic Elastomeric Paint.
SW: Conflex XL HB Smooth Elastomeric Coating, A5 Series.
CW: 1240 FlexLox High Build Exterior coating (OR) 1270 FlexLox Satin High Build

Exterior Coating: Finish coat should be applied with an airless sprayer and backrolled with a medium napp roller to eliminate pin holes.

7. Concrete, Stucco, and Masonry (Other than Concrete Masonry Units):

Flat Acrylic Finish: Two (2) finish coats over a primer.

Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.5 mils.
PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
SW: Loxon Exterior Acrylic Masonry Primer, A24-300.
CW: 335 Tropicoat Masonry Alkali-Resistant Primer (OR) 1240 Flex Lox High Build Coating Alkali-Resistant

First and Second Coats: Flat, exterior, acrylic-emulsion paint applied at a spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.4 mils.
PPG: 10 Line Pitt-Cryl Exterior Water Base Paint.
SW: A100 Exterior Latex Flat House Paint, A6 Series.

CW: C214 UltraTech Exterior 100% Acrylic Flat

C. INTERIOR:

1. Concrete and Masonry walls (Other than Concrete Masonry Units): Provide the following paint systems over interior concrete and brick masonry surfaces.

Flat Acrylic Finish: Two (2) finish coats over a primer. (Omit primer on previously painted surfaces.)

Primer: Alkali-resistant, acrylic-latex, interior primer applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 1.0 mil.

PPG: 6-2 Speedhide Interior Quick –Drying Latex Sealer.

SW: PrepRite 200 Interior Latex Wall Primer, B28W200.

CW: Ultra Tech C152 Interior Latex Primer-Sealer

First and Second Coats: Flat, latex-based, interior paint applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.5 mils.

PPG: 90 Line Wallhide Interior Wall Flat Latex Paint.

SW: ProMar 400 Latex Flat Wall Paint, B30W400.

CW: Ultra Tech C115 Interior Latex Flat

2. Concrete floors: Provide the following finish systems over interior concrete floors. Verify compatibility with curing and sealing agents prior to applying.

Satin, Acrylic-Enamel Finish: Two (2) finish coats over primer.

Primer: Alkali-resistant, waterborne acrylic-latex alkali resistant primer applied at spreading rate recommended by manuf. to achieve total dry film thickness of not less than 1.0 mil.

PPG: 6-603 Acrylic latex alkali resistant primer.

SW: ArmorSeal Tread-Plex Primer, B90 Series.

CW: Ultra Crete 3980 Acrylic Deck Coating

First and Second Coats: Satin waterborne DTM acrylic enamel paint applied at spreading rate recommended by manuf. to achieve total dry film thickness of not less than 2.5 mils.

PPG: 90-474 Satin acrylic DTM waterborne enamel.

SW: ArmorSeal Tread-Plex WB Acrylic Semi-gloss Floor Coating, B90 Series

CW: Ultra Crete 3980 Acrylic Deck Coating

3. Concrete Masonry Units: provide the following finish systems over interior concrete masonry block units:

Low-Luster, Acrylic-Enamel Finish: Two (2) finish coats over a block filler.

Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 5.0 mils.

PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.

SW: Preprite Block Filler, B25W25.

CW: 3250 Hi-Build Block Filler

First and Second Coats: Low-Luster (eggshell or stain), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.

PPG: 88-110 Satinhide Interior Enamel Wall & Trim LO-Lustre Semi-Gloss Latex.

SW: ProMar 200 Latex Eg-Shel Enamel, B20W2200 Series.

CW: UltraTech C106 Interior Eggshell Enamel

4. Epoxy Painted Concrete Masonry Units: provide the following finish systems over interior concrete masonry block units:

Semi-gloss Polyamid Epoxy Finish: Two (2) finish coats over a block filler.

Block Filler: Heavy Duty Acrylic block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 12mils.

PPG: 16-90 Pit-Glaze Heavy Duty Acrylic Block filler

SW: Heavy Duty Block Filler, B42W46.

CW: 3250 Hi-Build Block Filler

First and Second Coats: Semi-Gloss Polyamide Epoxy applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 5 mils.

PPG: 97 Line Aquapon Polyamide Epoxy Semi-Gloss Coating.

SW: Tile Clad H.S. Epoxy, B62Z-100 Series (Eg-Shel) or B70-200 Semi-gloss.

CW: 1300 Clean Coat Aqua Epoxy

5. Gypsum Board: provide the following finish systems over interior gypsum board surfaces:

Flat Acrylic Finish: Two (2) finish coats over a primer. (Walls scheduled to receive wall fabric shall receive one coat of Latex Primer – Tint Primer to match wall fabric).

Primer: Latex – based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

PPG: 17-10 Quick-Drying Interior Latex Primer-Sealer.

SW: PrepRite 200 Latex Wall Primer, B28W200.

CW: UltraTech C152 Interior Latex Primer-Sealer

First and Second Coats: Flat, acrylic-latex based, interior paint applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.5 mils.

PPG: 80 Line Wallhide Interior Wall Flat Latex Paint.

SW: ProMar 400 Latex Flat Wall Paint, B30W400.

CW: UltraTech C115 Interior Latex Flat

6. Painted Interior Wood Surfaces: Provide the following paint finish systems over new, interior wood surfaces.

Semi gloss, Acrylic-Enamel Finish: Two (2) finish coats over a wood undercoater. (Omit undercoater on previously painted surfaces.

Undercoat: Alkyd – or acrylic-latex based, interior wood undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

PPG: 6-755 Speedhide Interior Water-Based Undercoater.

SW: PrepRite ProBlock Latex Primer/Sealer, B51W20.

CW: Ultra Tech C152 Interior Latex Primer-Sealer

First and Second Coats: Semi gloss, acrylic-latex, interior enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.6 mils.

PPG: 88-110 Satinhide Interior Enamel Wall and Trim Lo-Lustre Semi-Gloss Latex.

SW: ProMar 200 Latex Semi-gloss Enamel, B31-2200.

CW: UltraTech C119 Interior Latex Semi-Gloss Enamel

7. Stained Woodwork: Provide the following stained finish over new, interior woodwork :

Waterborne, Satin-Varnish Finish: Two (2) finish coats of a waterborne, clear-satin varnish over a sealer coat and a waterborne, interior wood stain.

Stain Coat: Waterborne, interior wood stain applied at spreading rate recommended by manuf.

PPG: 77-302 Rez Interior Semi-Transparent Stain.

SW: Wood Classic Interior Oil Stain, A49-200.

CW: UltraTech C365 Semi-Transparent Wood Stain

Sealer Coat: Clear sanding sealer applied at spreading rate recommended by manuf.

PPG: 77-30 Rez Interior Quick-Drying Sealer and Finish.

SW: Wood Classic Fast Dry Sanding Sealer, B26V43.
CW: 901 Var-Prep

First and Second Finish Coats: Waterborne varnish finish applied at spreading rate recommended by manufacturer.

PPG: 77-49 Rez Satin Acrylic Clear Polyurethane.
SW: Wood Classic Water Borne Polyurethane Varnish A68 Series.
CW: UltraTech C167 Interior Polyurethane Satin Varnish

8. Painted Ferrous Metal (Hollow Metal doors and frames, electrical panel boxes etc.): Provide the following finish over interior metal work.

Semi gloss Acrylic-Enamel Finish: One finish coat over an enamel undercoater and a primer. (Omit primer on shop primed items)

Primer: Quick-drying rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by manufacturer for this substrate, applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
SW: Kem Kromik Universal Metal Primer, B50Z Series.
CW: UltraTech C305 Alkyd Rust Inhibitive Primer

Undercoater: Alkyd, interior enamel undercoat or semi gloss, acrylic-latex, interior enamel as recommended by the manufacturer for this substrate, applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.3 mils.

PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
SW: ProMar 200 Latex Semi-gloss Enamel, B31-2200.
CW: UltraTech C119 Interior Latex Semi-Gloss Enamel

Finish Coat: Semi gloss, acrylic-latex, interior enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.3 mils.

PPG: 88-110 Satinhide Interior Enamel Wall and Trim Lo-Lustre Semi-Gloss Latex.
SW: ProMar 200 Latex Semi-gloss Enamel, B31-2200.
CW: UltraTech C119 Interior Latex Semi-Gloss Enamel

9. Non-Ferrous Metal: Galvanized. Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

Semi gloss, Acrylic-Enamel Finish: Two (2) finish coats over a galvanized metal primer.

Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
SW: DTM Acrylic Primer/Finish, B66W1.
CW: UltraTech C309 Universal Water-Based Metal Primer

First and Second Coats: Semi gloss, acrylic-latex enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.6 mils.

PPG: 88-110 Satinhide Interior Enamel Wall and Trim Lo-Lustre Semi-Gloss Latex.
SW: ProMar 200 Latex Semi-gloss Enamel, B31-2200.
CW: UltraTech C119 Interior Latex Semi-Gloss Enamel

10. Metal Decking, Bar Joists, exposed metal structure (non-galvanized): Provide the following finish systems over shop primed metal surfaces:

Flat Waterborne Acrylic Dry Fall Finish: Two (2) coats applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of 4 mils.

PPG: Speedhide Latex dry Fog Flat Spray Paint, 6-715
SW: Waterborne Acrylic Dryfall, Flat, B42W1
CW: UltraTech C157 Interior Latex Flat Dryfall
CW: UltraTech C309 Universal Water-Based Metal Primer

CW: UltraTech C119 Interior Latex Semi-Gloss

11. Aluminum surfaces in contact with masonry or steel to have a coat of zinc chromate.

3.07 MECHANICAL AND ELECTRICAL ITEMS:

- A. All equipment such as pumps, tanks, air units, compressors, cabinets, etc., that have had their paint defaced, scarred or skinned shall be touched up with machinery enamel.
- PPG: Lavax Machinery Enamel, 23- Line.
SW: Steel Spec Fast Dry Alkyd Enamel, B55W811.
CW: UltraTech C248 Exterior Alkyd Semi-Gloss Enamel
- B. All uncovered pipe hangers, tank stands, equipment support stands and brackets, uncovered portions of tank, and other mechanical apparatus, including factory finished items, shall be painted as scheduled above for painted ferrous metal.
- C. All hot water, cold water, steam, condensation, circulating water lines for heating and cooling, drains gas piping, electrical conduit, junction boxes and similar items exposed shall be painted as scheduled above for painted ferrous metal, galvanized metal or Aluminum Metal-lite, as appropriate for the substitute.
- D. All electrical panel boxes, box covers, conduit junction boxes, brackets and accessories except those in electrical rooms shall have field finish paint, as scheduled above for ferrous metal over prime finish, or factory finish.
- E. Exposed Ductwork: As scheduled above for galvanized metal. Interior of ducts exposed to view shall be painted flat black for the first two (2) feet beyond grill or diffuser.

End of Section

SECTION 10 14 00 - SIGNAGE

1 PART I GENERAL

1.01 SCOPE:

- A. Furnish all materials, labor, equipment, and supervision necessary to provide and install signage as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 WARRANTY:

- A. Provide manufacturers standard warranty.

2 PART II PRODUCTS

2.01 INTERIOR SIGNAGE MANUFACTURERS

- A. Provide specified sign products as manufactured by:
 - 1. Scott Sign Systems (by Identity Group), Nashville, TN, 615-515-9008.
- B. Manufacturers pre-approved to provide alternate, equal products meeting the specified requirements include the following:
 - 1. APCO Signs
 - 2. ASI Sign System
 - 3. InPro Corporation
 - 4. Vomar Products, Inc.
 - 5. Additional alternate manufacturers must be approved by Architect prior to bidding.

2.02 INTERIOR SIGNAGE

- A. Provide and install signage of type, color, thickness and mounting style as indicated on the drawings. If not indicated on the drawings, provide and install signage equal to molded polymer "Square Corner ADA Plaques" as manufactured by Scott Sign Systems.
 - 1. Size: 6" x 9" with radius corners
 - 2. Color: As selected by Architect from manufacturer's full range of color selections.
 - 3. Thickness: 1/8"
 - 4. Mounting: Factory-applied Very High Bond (VHB) Tape
- B. Signs shall read as indicated below: Each shall have a graphic symbol, the applicable international symbol of accessibility and Grade 2 Braille as required by the Americans with Disabilities Act. Model numbers indicated are of Scott Sign Systems.
 - 1. Doors into accessible restrooms indicated for male use shall have a sign which reads "MEN" and shall have man and ADA graphic equal to model #APMENA69.
 - 2. Doors into restrooms indicated for male use shall have a sign which reads "MEN" and shall have man graphic equal to model #APMEN69.
 - 3. Doors into accessible restrooms indicated for female use shall have signs which reads "WOMEN" and have the woman and ADA graphic equal to model #APWOMA69.
 - 4. Doors into restrooms indicated for female use shall have signs which reads "WOMEN" and have woman graphic equal to model #APWOM69.

5. Doors into accessible restrooms indicated for use by both sexes shall have a sign which reads "RESTROOM" and have the unisex graphic showing both a male and female character and ADA graphic equal to model #APRESA69.
6. Doors into restrooms indicated for use by both sexes shall have a sign which reads "RESTROOM" and have the unisex graphic showing both a male and female character equal to model #APRES69.
7. Doors into Stairways shall have a sign which reads "STAIRS" and shall have an ADA-compliant graphic equal to model #APSTR69.
8. Elevator doors not on the level of egress shall have a sign which reads "IN CASE OF FIRE USE STAIRS" and ADA-compliant graphic equal to model #APINC69.
9. Doors indicated on the drawings as an egress door shall have a sign which reads "EXIT" and shall have ADA-compliant graphic equal to model #APEXT69.

2.03 EXTERIOR SIGNAGE

- A. Building Mounted Letters: Provide individual letter monument mounted sign consisting of molded plastic letters made of Cellulose Acetate Butyrate (CAB) similar and equal to Minnesota letters as manufactured by Gemini Inc.
 1. Size and Text shall be as indicated on the drawings. Whether or not indicated on drawings, provide 8" street numbers indicated in Project Address in color selected by Architect from manufacturer's full range to be installed in location selected by Architect.
 2. Color shall be as selected by the Architect from Manufacturer's full range.
 3. Provide mounting hardware to provide 1/2" standoff mounting on indicated substrate. Provide 1" anchored standoff mounting if indicated for installation on masonry surface.
 4. Provide layout template for accurate placement of letters on wall.
- B. Reader Board: Reader Board signage shall consist of a single face non-illuminated sign system of the size shown on the drawings as manufactured by Wagner Zip-Change, Melrose Park, IL, Rankin Signs, H and H signs or approved equal. Sign frame shall consist of bronze anodized aluminum channel slotted on all four sides to accept bolt heads for holding mounting brackets. Sign face shall be corrugated white aluminum with clear acrylic letter tracks to accommodate 5 rows of 6 inch high flat polycarbonate letters. Provide one 300 Font letter and number set with punctuation set in black with suitable letter storage cabinet. Provide all necessary mounting hardware to attach reader board to sign structure.
- C. Post and Panel Site Signs:
 1. Handicapped Parking Signs shall be as indicated on drawings. If not indicated, signs shall be RT-8 and R7-8D Type, as required by the ADA, 12" x 18" center post 7' height to bottom of sign. Van accessible space shall have the words "Van Accessible" on the bottom of the sign. Provide and install one sign per accessible parking space.
 2. Aluminum Sheet: Alloy and temper recommended by the aluminum producer and finisher for the type of use and finish indicated, and with at least the strength and durability properties specified in ASTM B 209 for 5005-H15 alloy.
 - a. Panel Material: 0.125-inch- thick aluminum plate.
 - b. Panel Finish: Baked enamel.
 - c. Corner Condition: Corners rounded to 2"radius.
 - d. Surface-Applied, Die-Cut Vinyl Copy: Provide die-cut characters from nonreflective vinyl film with pressure-sensitive adhesive backing. Apply copy to exposed face of sign panel.
 3. Steel Tubing: Cold-formed steel tubing conforming to ASTM A 500, Grade B, hot-dip galvanized after fabrication with a minimum of 2.0 oz. of zinc/sq. ft. of surface area conforming to ASTM A 123.

4. Vinyl Film: Opaque, nonreflective vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior applications.
5. Colored Coatings for Plastic Sheet: Use nonfading colored coatings, including inks and paints for copy and background colors, which are recommended by the manufacturers for optimum adherence to the type of surface used.
6. Concrete for Post Holes: Mix Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and clean water to obtain concrete with a minimum 28-day compressive strength of 2500 psi. Use at least 4 sacks of cement/cu. yd., 1-inch maximum-size aggregate, maximum 3-inch slump, and 2 to 4 percent entrained air.
7. Steel Posts: 0.120-inch, galvanized, seamless, square steel posts in length adequate for mounting method specified. Include post caps, fillers, spacers, junction boxes, access panels, and related accessories required for a complete installation. Comply with the following requirements for post shape, finish, and mounting method indicated:
 - a. Post Size: 3 by 3 inches square.
 - b. Post Mounting Method: Provide sign posts of length required for permanent installation by direct-burial mounting method.

3 PART III EXECUTION

3.01 SIGNAGE

- 4 A. Provide and install signage where indicated on drawings.
- 5 B. Whether or not shown on drawings provide and install interior signage in the following locations:
 1. At doors into all toilet rooms
 2. At doors into stairways
 3. At elevator doors
 4. At doors indicated as a means of egress.

3.02 INSTALLATION:

- B. Locate signs where indicated on the drawings and in strict accordance with ADA regulations.
- C. Install in accordance with manufacturers recommendations.
- D. Installation of Panel and Post Signs:
 1. Excavation: In firm, undisturbed or compacted soil, drill or (using a post-hole digger) hand-excavate holes for each post to the minimum diameter recommended by sign manufacturer, but at least 4 times the largest post cross-section.

End of Section

SECTION 10 21 15 – STAINLESS STEEL TOILET COMPARTMENTS

PART I GENERAL

1.01 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.02 WORK INCLUDED:

- A. Furnish and install stainless steel ceiling hung toilet compartments in toilet rooms as shown on the drawings and as specified herein.

1.03 SUBMITTALS:

- A. Submit product data, and shop drawings, in accordance with Section 013300 Submittals. Include details of construction relative to materials, fabrication, installation, anchors, hardware, and fastenings. Provide plans, elevations, details, and attachments to other work.
- B. Field Measurements: Verify dimensions in areas of installation by field measurement before fabrication and indicate measurements on Sop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

PART II PRODUCTS

2.01 MANUFACTURER:

- A. Toilet compartments shall be the product of Global, Bobrick, American, AMPCO, Mills, Mid-South, All American, Metpar, or Weis.

2.02 MATERIAL:

- A. Stainless-Steel Sheet: ASTM A666, Type 302 or 304, that is leveled to stretcher-leveled flatness, finished on exposed faces as indicated in the "Stainless-Steel Finishes" Article, and of the following minimum thicknesses:

Pilasters: 0.0500 inch.
Panels and Screens: 0.0375 inch.
Doors: 0.0312 inch.
Tapping Reinforcement: 0.0781 inch.
- B. Core Material for Metal-Faced Units: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch minimum for doors, panels, and screens and 1-1/4 inches minimum for pilasters
- C. Pilaster Shoes and Sleeves(Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch thick and 3 inches high , finished to match hardware.
- D. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:
- E. Stainless Steel

- F. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:
- G. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel finished to match hardware, with theft-resistant heads. **Chrome-plated steel and brass hardware will not be acceptable. Provide sex-type bolts for through-bolt applications. For concealed anchors and fasteners, use stainless steel.**

2.03 FABRICATION:

- A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment mounted hardware, accessories, and grab bars, as indicated. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab-bars, as indicated.
- B. Metal-Faced Toilet Compartments and Screens: Pressure laminate seamless face sheets to core material and provide continuous, interlocking molding strip or lapped and formed edges. Seal corners by welding or clips. Grind exposed welds smooth.
- C. Doors out of compartments with grab bars shall be of a size to allow for a clear opening of 32". All other doors shall be 24" wide.
- D. Wall-Hung /Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.
- E. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
- F. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
- G. Coat Hook: manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment- mounted accessories.
- H. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
- I. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible

2.04 STAINLESS-STEEL FINISHES:

- A. General: Comply with NAAMM's Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying designating finishes.
- B. Remove or blend tool and die marks and stretch lines into finish.
- C. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- D. Finish: Manufacturer's standard No. 3 or No. 4 directional polish.
- E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

- F. Emboss metal with textured surface to resist scratches and hide streaking.
 - 1. Architect to select texture from manufacturer's full range of available textures.
- G. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

PART III EXECUTION

3.01 INSTALLATION:

- A. General: Comply with manufacturer's written instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than ½ inch between pilasters and panels and not more than 1 inch between panels and walls. Secure units with manufacturer's recommended anchoring devices.
- B. Mounting: Ceiling Hung

3.02 ADJUSTING AND CLEANING:

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 20 degrees from closed position when unlatched. Set hinges on out-swing doors to return to fully closed position.
- B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

End of Section

SECTION 10 28 00 - TOILET ROOM ACCESSORIES

PART I GENERAL

1.01 SCOPE:

- A Furnish and install toilet room accessories and miscellaneous accessories as listed herein and shown on the drawings.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 06 10 00 Rough Carpentry

1.03 SUBMITTALS:

- A Submit to the Architect for approval a brochure containing catalog cuts and full description of accessories proposed for use and a schedule of accessories.

PART II PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A Accessories shall be specified or indicated model numbers by specified or indicated manufacturers unless alternate products are approved by Architect prior to bidding. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements. Acceptable manufacturers include Bobrick Washroom Equipment, Inc., American Specialties Inc., Bradley Corporation and Frost Products Ltd.

2.02 TYPE OF ACCESSORIES:

- A Mirrors shall be as noted on drawings. If not noted, provide frameless, float plate glass mirror 24" x 36" attached to wall with 4 minimum clear plastic mirror clips.
- B Toilet accessories shall be as scheduled on the drawings. If manufacturers and/or model numbers are not indicated on the drawings, provide the accessories indicated below for each accessory shown on the drawings. Accessories in this schedule may or may not apply to this project.

- | | | |
|-----|-----------------------------|--|
| 1. | Paper Towel Dispenser: | Bobrick Model No. B-262. |
| 2. | Toilet Paper Dispenser: | Bobrick Model No. B-6857 |
| 3. | Vandal-Resist. T.P. Disp'r: | Bobrick Model No. B-264 (w/ 283-604 spindle) |
| 4. | Toilet Stall Grab Bar: | Bobrick Model No. B 6806 x 42, B 6806 x 36 & B 6806 x 18 |
| 5. | Mop Rack: | Bobrick Model No. 224, 36" long |
| 6. | Soap Dispenser: | Bobrick Model No B-2111 |
| 7. | Feminine Napkin Recept.: | Bobrick Model No. B-270 |
| 8. | Robe Hook: | Stanley Model No. 819065 |
| 9. | Shower Grab Bar: | Bobrick Model No. B-5837 |
| 10. | Shower Curtain Rod: | Bobrick Model No. B 6047 |
| 11. | Vinyl Shower Curtain: | Bobrick Model No. 204-3 (for 36" wide showers use 204-2) |
| 12. | Weighted Shower Curtain: | Dynamic Living Inc. Model No. DL6232 (for all roll-in showers) |
| 13. | Shower Curtain Hooks: | Bobrick Model No. B-204-1 as required to match curtain. |
| 14. | Shower Seat: | Bobrick Model No. B-5837 |
| 15. | Shower Soap Holder: | Bobrick Model No. B-974 |
| 16. | Towel Bar: | Bobrick Model No. B 6206 x 24 |

2.03 BARRIER FREE SHOWER THRESHOLD:

- A Provide barrier free vinyl water dam threshold with aluminum track at all handicap accessible showers. Acceptable product is Barrier Free Water Dam as manufactured by Tub Master 413 Virginia Drive, Orlando, Florida, 32803, 800-327-911 or approved equal.

2.04 BABY CHANGING STATION:

- A. Provide horizontal-design, FDA-approved, 300 lb.-capacity baby changing station with Braille instructions, pneumatic gas spring operation and anti-microbial properties by Koala Corp., Bradley Corp or equal approved by Architect prior to Bidding. Hinges shall be reinforced, full length steel on steel and mounting supports must be multiple 11 ga. steel. Style and material shall be as indicated on the drawings. If not indicated, provide the following:
1. For newly constructed walls, provide stainless steel clad recess-mounted unit with grey polyethylene interior.
 2. For existing walls, provide stainless steel clad wall-mounted unit with grey polyethylene interior.
 3. For units indicated to be mounted within an accessible toilet stall, provide grey, molded-HDPE unit.

2.05 UNDERCOUNTER PIPE GUARDS:

- A. Where undercounter pipes are exposed to view and as required by ADA guidelines, provide soft, resilient molded-vinyl pipe guards equal to Trubro Lav Guard as manufactured by IPS Corporation of Collierville, TN in model numbers, sizes and lengths required for the pipes indicated. Guards shall be virtually indestructible with a nominal wall of 1/8" with internal ribs. Guards shall be self-extinguishing according to ASTM D635 tests and result in zero mold growth according to ASTM G21 and G22 testing. Must be capable of being wiped clean using common detergents.

PART III EXECUTION

4.01 INSTALLATION:

- A Accessories shall be substantially secured in place with fastenings most suitable for the construction to which they are fastened. All exposed fasteners shall be stainless steel or chromium plated brass and shall be Phillips Head Screws or Bolts.
- B For gyp. bd. installations where no wood blocking has been provided, install accessories using GCW40 as manufactured by Winglts, LLC, 181 West Clay Avenue, Roselle Park NJ 07204, 877-894-6448, www.winglts.com.
- C The exact location of accessories shall be as directed by the Architect.
- D Install barrier free shower threshold in accordance with manufacturer's latest printed instructions and Americans with Disabilities Act guidelines.

End of Section

SECTION 10 28 13 ELECTRIC HAND DRYERS

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

1.2 SECTION INCLUDES

- A. Electric hand dryers.

1.3 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry.
- B. Section 05 40 00 – Cold Formed Metal Framing and Sheathing.
- C. Division 26 - Electrical: Electrical systems and components.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00 - Submittals.
- B. Product Data: Provide construction details, dimensions, anchoring and mounting requirements, material and finish descriptions, electrical requirements, and manufacturer's warranty.
- C. Operation and Maintenance Data: Provide for electric hand dryers to include in maintenance manuals.
- D. Warranty: Provide sample of manufacturer's standard warranty for parts and labor.

1.5 QUALITY ASSURANCE

- A. Product Certification: ETL listed in accordance with UL 507. National Sanitation Foundation (NSF) Protocol P335 "Hygienic Commercial Hand Dryers" compliant.
- B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Hand dryers shall be certified by Underwriters Laboratory (UL), Inc. and shall bear UL labels.

- D. Hand Dryers shall be provided and installed in compliance with ICC/ANSI A117.1.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle electric hand dryers in manufacturer's protective packaging.
- B. Store electric hand dryers off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

1.7 COORDINATION

- A. Coordinate locations of electric hand dryers with other work to prevent interference with clearances required for access, and for proper installation, adjustment, operation, cleaning, and servicing of electric hand dryers.

1.8 WARRANTY

- A. Manufacturer's Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective electric hand dryer components and labor within specified warranty period.
 - 1. Warranty Period: Five (5) years limited for labor and five (5) years for parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Dyson Airblade V Electric Hand Dryers manufactured by Dyson Inc., 600 W. Chicago Avenue, Suite 275, Chicago, IL 60610; 888-397-6622, <http://airblade.dyson.com/> or comparable product acceptable to the Architect.
- B. Substitutions will be considered under provisions of Section 01 25 00.

2.2 ELECTRIC HAND DRYERS

- A. Electric Hand Dryers: Dyson Airblade V Electric Hand Dryer Model AB12; Item No. 25887-01 (HU02).

1. Mounting: Surface mounted on ABS/PBT plastic backplate/mounting bracket; protrudes four inches from wall, no recessing required; ADA compliant.

Color Finish: Sprayed nickel finish.

2. Filtration: 99.97 percent particulate efficiency HEPA filter with anti-microbial coating.
3. Operation: Touch-free infra-red activation.
 - a. Hand dry time: 12 seconds
 - b. Airspeed at nozzle: 420 mph
 - c. Operating Airflow: Up to 28 l/s.
 - d. Rated Operating Noise Power: 84 db(A)
4. Motor: Dyson Digital Motor (DDM), V4 switched reluctance brushless DC type; 92,000 rpm motor speed; less than 0.5 watt standby power consumption.
5. Electrical Requirements: 110-120 V AC, 12 A, 1400 W.
6. Operating Temperature Range: 0 - 40 degrees C.
7. Standby Power Consumption: Less than 0.5 W.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify availability and characteristics of electrical power. Drill minimum two (2) inch diameter holes for electrical service entrance through backplate.
- B. Do not begin installation until substrates are complete and ready for installation of electric hand dryers.

3.2 INSTALLATION

- A. Locate and install mounting bracket in accordance with manufacturer's written instructions. Use minimum 0.25-inch anchors to mount bracket. Mount electric hand dryer at height above finished floor recommended by manufacturer.
- B. Install electric hand dryer in accordance with manufacturer's written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer. Install electric hand dryers level, plumb, and firmly anchored in locations and at heights indicated.

3.3 CLEANING AND PROTECTION

- A. Adjust electric hand dryers for smooth operation. Replace damaged or defective components.
- B. Remove protective coverings from finished surfaces.
- C. Clean exposed surfaces using materials and methods recommended by manufacturer.

END OF SECTION

SECTION 104400 - FIRE EXTINGUISHERS

PART I GENERAL

1.01 SCOPE:

- A Furnish and install fire extinguishers and cabinets, as shown on drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit manufacturer's data for fire extinguishers and cabinets including mounting recommendations.

1.04 QUALITY ASSURANCE:

- A Fire extinguishers shall be UL listed with UL listing mark for type, rating and classification of extinguisher.

PART II PRODUCTS

2.01 MATERIALS:

- A. Fire extinguishers shall be J. L. Industries Cosmic Series E, Model 10, Dry Chemical Extinguisher or approved equal of Elkhart, Casco, Larsen, Allenco, Badger-Powhatter, and Ansul.
- B. Extinguisher cabinet shall be model 1526 with clear bubble, 1-1/2 inch square edge trim, powder coated steel frame cabinet. Cabinet shall have zinc plated handle and roller catch. Provide Mark Bracket MB846 for attachment of extinguisher inside cabinet.
- C. Fire extinguisher cabinets located in fire rated walls shall be provided with FX fire rated tub option.
- D. Fire extinguishers indicated in the drawings for mounting within a Kitchen shall be J. L. Industries Saturn Series, Class K, Wet Chemical Extinguisher or approved equal of Elkhart, Casco, Larsen, Allenco, Badger-Powhatter, and Ansul.

PART III EXECUTION

3.01 INSTALLATION:

- A Examine walls and partitions for thickness and framing for cabinets to verify cabinet depth and mounting prior to cabinet installation.
- B Follow manufacturer's printed instructions for installation.
- C Install in locations and at mounting heights located, or if not indicated, at heights to comply with applicable regulations of governing authorities.
- D Install fire extinguisher cabinets in fire rated walls in accordance with manufacturer's instructions for maintaining fire rating of wall assembly.

SECTION 12 24 13 – ROLLER SHADES

PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, materials, equipment and supervision necessary to provide and roller shades at conference rooms and lobby with exterior windows.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A Submit manufacturer's data showing installation details and color choices for selection by the Architect.
- B Samples for Verification: For the following products, prepared on Samples from the same material to be used for the Work.
 - 1. Shade Fabric: Not less than 12 inches (300 mm) square.

1.04 PROJECT CONDITIONS:

- A Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.05 WARRANTY

- A. Manufacturer's standard Limited Lifetime

PART II PRODUCTS

2.01 MATERIALS:

- A Roller shades shall be ElectroShade® 2 System Regular roll, Motorized roller-screen shading system with 50 mm tubular motor.
 - 1. Control system shall be: IQ/MLC™ Hardwired Low Voltage Controls.
 - 5 alignment positions including 3 intermediate set points.
 - Uniform mode –allowing shades to stop solely at preset positions for building uniformity.
 - Local, group and master control features.
 - Provide Master and local switches.
- B Shade fabric shall be ThermoVeil® 1300 series with an approximate openness factor of +/- 5%.
 - 1. Color: Silver Birch #1319.
 - 2. Snaploc® shade mounting spline.
 - 3. Maximum shade length: 10'-0".

- C Brackets: Electro 2 brackets with Snapsock® fascia with endcaps and .Bottom Rail:
- D Provide Battens for Railroaded shades in accordance with manufacturer's recommendations.
- E Bottom edge of shades at curtain wall "L" shall cover the upper section of curtain wall above the intermediate mullion only when fully lowered.

PART III EXECUTION

3.01 ROLLERSHADE INSTALLATION:

- A Install shades level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so shade edges in any position are not closer than 1 inch to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent shades and for operating glazed opening's operation hardware, if any.

3.02 ADJUSTING:

- A Adjust horizontal shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.03 CLEANING AND PROTECTION:

- A Clean shade surfaces after installation, according to manufacturer's written instructions.
- B Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C Replace damaged shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

End of Section

SECTION 23 34 00 - HVLS FANS

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, material, equipment, and supervision to provide and install ceiling-mounted, circulation fans, mounting hardware and all necessary or optional accessories specified herein.
- B. Installation of the fan, miscellaneous or structural metal work (if required), field electrical wiring, cable, conduit, fuses and disconnect switches, other than those addressed in the installation scope of work, shall be part of the General Contractor's Scope of Work, but may be performed by subcontractors other than the fan manufacturer as allowed by the fan manufacturer.

1.02 RELATED SECTIONS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Division 21	Fire Suppression
Division 23	Heating, Ventilating, and Air Conditioning (HVAC)
Division 26	Electrical

1.03 REFERENCES

- A. National Fire Protection Agency (NFPA)
- B. Underwriters Laboratory (UL)
- C. Canadian Standards Association (CSA)
- D. National Electric Code (NEC)
- E. International Organization for Standardization (ISO)

1.04 SUBMITTALS

- A. Shop Drawings: Drawings detailing product dimensions, weight, and attachment methods
- B. Product Data: Specification sheets on the ceiling-mounted fan, specifying electrical and installation requirements, features and benefits, and controller information
- C. Installation Guide: The manufacturer shall furnish a copy of all operating and maintenance instructions for the fan.

1.05 QUALITY ASSURANCE

- A. Certifications:
 - 1. The fan assembly, as a system, shall be ETL-certified and built pursuant to the guidelines set forth by UL standard 507 and CSA standard 22.2 No. 113-08.
 - 2. The fan shall be compliant with NFPA 13—Standard for the Installation of Sprinkler Systems, NFPA 72—National Fire Alarm and Signaling Code, and NFPA 70-2011—NEC.
 - 3. Controllers shall comply with NEC and UL standards and shall be labeled where required by code.
- B. Manufacturer Qualifications:

1. The fan and any accessories shall be supplied by a manufacturer having a minimum of ten (10) years of product experience.
 2. Manufacturer shall be ISO 9001:2008-certified
- C. Installer Qualifications: Installer must be state-licensed contractor, licensed and qualified to do the work described.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Deliver product in original, undamaged packaging with identification labels intact. The fan shall be new, free from defects, and factory tested.
- B. The fan and its components must be stored in a safe, dry location until installation.
- 1.07 WARRANTY
- A. Manufacturer shall replace any products or components defective in material or workmanship free of charge (including shipping/transportation), pursuant to the terms and conditions of the manufacturer's standard Non-Prorated Warranty in accordance with the following schedule:
1. Hub and Airfoil Parts: Until product is discontinued but not less than 10 years
 2. Motor, Drive & Controller: 5 years

PART 2 - PRODUCT

2.01 PRODUCT AND MANUFACTURER

- A. Provide and install 8-foot diameter Isis Model Fans as manufactured by Delta T Corporation, dba Big Ass Fans, PO Box 11307, Lexington, Kentucky 40575, 877-244-3267, Fax 859-233-0139, www.bigassfans.com.
- B. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding all specified requirements.

2.02 HIGH VOLUME, LOW SPEED FANS

- A. General Requirements:
1. Fans and installation shall meet all Quality Assurance requirements specified herein.
 2. Fan components shall be designed specifically for high volume, low speed fans. Sound levels from the fan operating at maximum speed measured in a laboratory setting shall not exceed 35 dBA.
 3. Color: Colors shall be selected by the Architect.
 4. Good workmanship shall be evident in all aspects of construction. Field balancing of the airfoils shall not be necessary.
- B. Controls: Fan controller shall be incorporated into the fan assembly and housed in an enclosure independent of the motor to prevent overheating or electrical interference. Controller shall be factory programmed to minimize starting and braking torques and shall be equipped with a simple diagnostic program and an LED light to identify and relay system faults.
- C. Airfoil System:
1. Fans shall be equipped with eight (8) high volume, low speed airfoils of precision extruded, anodized aluminum alloy.

2. The airfoils shall be connected to the hub and interlocked with eight (8) stainless steel retainers and two (2) sets of clear zinc-plated steel bolts and lock washers per airfoil on indoor fans and stainless steel bolts and lock washers per airfoil on outdoor fans.
 3. Fans shall be equipped with eight (8) vertical winglets designed to redirect outward airflow downward. Winglets shall be molded of high strength polymer and shall be attached at the tip of each airfoil with a stainless steel screw.
- D. Motor:
1. Motor shall be a permanent magnet brushless motor rated for continuous operation at maximum speed with the capability of modulating the fan speed from 0–100% without the use of a gearbox or other mechanical means of control.
 2. Motor shall operate from any voltage ranging from 100–130 VAC, single phase, 60Hz, or 200–250 VAC, single phase, 50 Hz, without requiring adapters or customer selection.
 3. Motor shall be a non-ventilated, heat sink design capable of continuous operation in - 40°F to 131°F (-40°C to 55°C) ambient conditions.
 4. Fans to be installed in wet locations shall include a motor with potted electronics to protect from moisture.
- E. Mounting System: Designed for quick and secure installation to the mounting structure, all components in the mounting system shall be of formed low-carbon steel and contain no critical welds. The mounting systems shall be powder coated.
- F. Hub: The hub shall be constructed of steel and precision machined to achieve a well-balanced and solid rotating assembly. The hub shall incorporate five (5) safety retaining clips made of 1/8" (0.3 cm) thick steel that shall restrain the hub/airfoil assembly in case of shaft failure.
- G. Safety Cable: Fans shall be equipped with a safety cable that provides an additional means of securing the fan assembly to the building structure. Cable shall be Ø3/16" (0.48 cm) diameter and fabricated of 7 x 19 zinc-galvanized steel cable, pre-loaded and tested to 3,200 lbf (13,345 N). Field construction of safety cables is not permitted.
- H. Wall Control: Provide and install remote wall control providing control of all fan functions. The wall control shall be mounted to a standard electrical box and shall include a display for controlling the fan's power and speed. Communication with the fan drive and controller shall be by a standard line voltage cable (14 Ga/3 wire with ground) that is field installed.
- I. Includes a 10–30 VDC pilot relay for seamless fire control panel integration. The pilot relay shall be wired Normally Open or Normally Closed in the field.
- J. Provide and install guy wire for installations with extension tubes 4 ft (1.2 m) or longer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Consult manufacturer for proper mounting method for indicated substrate/structure. Provide any mounting hardware, supplemental structural items or accessories as required.
- C. Fan location must be free from obstacles such as lights, cables, or other building components.
- D. Check fan location for proper electrical requirements. Provide dedicated branch circuit protection for each fan.

3.02 INSTALLATION

- A. Install the fan according to the Installation Guide.

- B. In buildings equipped with sprinklers, including ESFR sprinklers, fan installation shall comply with all of the following:
1. The HVLS fan shall be centered approximately between four adjacent sprinklers.
 2. The vertical clearance from the HVLS fan to the sprinkler deflector shall be a minimum of 3 ft (0.9 m).
 3. All HVLS fans shall be interlocked to shut down immediately upon receiving a waterflow signal from the alarm system in accordance with the requirements of NFPA 72—National Fire Alarm and Signaling Code.

End of Section

SECTION 31 10 00 – SITE PREPARATION

PART I GENERAL

1.01 SCOPE:

- A Work shall include, but not be limited to: Protection of existing trees to remain, removal of trees and other vegetation scheduled to be removed, topsoil stripping, clearing, grubbing, and removal of above and below grade improvements.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

Section 31 20 00 Earthwork

1.03 PROJECT CONDITIONS:

- A Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
- B Protection of Existing Improvements:
1. Provide protections necessary to prevent damage to existing improvements indicated to remain.
 2. Protect improvements on adjoining properties and on the Owner's property.
 3. Restore damaged improvements to their original condition, as acceptable to property owners and other parties having jurisdiction
- C Protection of Existing Trees and Vegetation:
1. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering or trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within the drip line. Provide temporary guards to protect trees and vegetation to be left standing.
 2. Water trees and other vegetation to remain within the limits of the contract work as required to maintain their health during the course of construction operations.
 3. Provide protection for roots over 1-1/2" in diameter which are cut during construction operations. Coat the cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out. Cover with earth as soon as possible.
 4. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to the Architect. Employ a licensed arborist to repair damages to trees and shrubs. Replace trees which cannot be repaired and restored to full growth status, as determined by the arborist.
- D Salvageable Improvements: Carefully remove items indicated to be salvaged, and store on the Owner's premises where indicated or directed.

PART II PRODUCTS

NOT USED

2PART III EXECUTION

2.01 SITE CLEARING:

A General:

1. Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on the site or premises unless specifically indicated to remain. Removal includes digging out and off-site disposing of roots and stumps.
2. Carefully and cleanly cut minor roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

B Topsoil:

1. Topsoil is defined as friable clay loam surface soil found in depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
2. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
3. Remove heavy growths of grass from areas before stripping.
4. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
5. Stockpile topsoil in storage piles in areas shown, or where otherwise directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

C Clearing and Grubbing:

1. Clear site of trees, shrubs and other vegetation, except for those specifically indicated to be left standing.
2. Completely remove stumps, roots, and other debris protruding through the ground surface.
3. Use only hand methods for grubbing inside the drip lines of trees indicated to be left standing.
4. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
5. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.

D Removal of Improvements:

1. Remove above-ground and below-grade improvements as indicated and as necessary to facilitate new construction.
2. Abandonment or removal of certain underground pipe or conduits may be shown on mechanical or electrical drawings, and is included under work of related Division 15 and 16 Sections. Removal of abandoned underground piping or conduit interfering with construction is included in this Section.

2.02 DISPOSAL OF WASTE MATERIALS:

A Burning is not permitted on the Owner's property.

B Remove waste materials and unsuitable or excess topsoil from Owner's property and dispose of legally.

End of Section

SECTION 312000 - EARTHWORK

PART I GENERAL

1.01 SCOPE:

- A Do all excavating, filling, backfilling, grading, and all necessary incidental work in connection therewith, required to install all work shown and specified under the Contract, except trenching and backfilling for underground piping and conduit.
- B Work shall include, but not be limited to: Soils Engineer monitoring, excavating and grading for building drives and walks, controlled filling and porous fill.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

Section	00250	Subsurface Investigation Report
Section	014000	Quality Control Services
Division	20	Plumbing
Division	26	Electrical

1.03 EXAMINATION OF THE SITE:

- A Bidders upon work under this section, before submitting bids, shall visit and carefully examine the site so as to familiarize themselves with the existing conditions including amount of topsoil available, and the difficulties that will affect the execution of the work. The submission of a bid will be construed as evidence that such an examination has been made.

1.04 SUBMITTALS:

- A Submit one copy of permits and notices obtained from authority having jurisdiction before commencing work.
- B Obtain and submit certification of adequacy of site grading and filling from Testing Laboratory, signed and sealed by the Geotechnical Engineer of record, registered in the state in which the work is performed, stating that work is in accordance with Contract Documents, and that soils are capable of supporting the structure to be constructed under the Contract.
- C If bench marks and other permanent reference points are displaced, obtain and submit certification, signed and sealed by a licensed surveyor, of proper re-establishment of bench marks and reference points.
- D The Contractor shall submit samples of approximately 50 pounds each of the fill materials he proposes to use to the testing agency approved by the Owner at least ten (10) days prior to its use. The testing agency shall test such samples and classify them as specified by the U.S. Bureau of Public Roads, and shall determine the moisture-density in pounds per cubic foot of oven dried weight.

1.05 SPECIAL INSPECTIONS:

- A Testing during fill operations will be performed by a Special Inspector retained by the Owner.
- B During the fill operation, field compaction tests shall be made as often as deemed necessary by the selected Special Inspector to determine the percent compaction of any completed layer. There shall be taken not less than one compaction test for every 900 square feet for each foot depth to fill. There shall be a representative of the testing agency present on site at all times when

engineered fill is being placed. If such test shows failure to meet the required compaction due to insufficient moisture, too much moisture, insufficient rolling or other known causes, the Contractor shall remedy the condition by bringing the material to optimum moisture content or by continued rolling and recompaction. In no case shall the Contractor be permitted to continue filling if the underlying layers fail to meet compaction requirements.

C Foundation Bearing Materials Testing.

1. The Special Inspector shall observe all footing excavations immediately prior to placing **reinforcing steel or concrete**.
 - a. For foundations bearing on residual (natural) soils, the bearing materials shall be probed with a minimum ½ inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with dynamic cone penetrometer to verify the design bearing capacity. Test frequency shall be one cone penetrometer test per four individual foundations and per 100 linear feet of strip foundations.
 - b. For foundations bearing on fill (under the present contract) soils, the bearing materials shall be probed with a minimum ½ inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with a nuclear density gauge to verify the in-place percent compaction conforms to the applicable compaction criteria. Test frequency shall be one nuclear density test per four individual foundations and per 100 linear feet of strip foundations.

1.06 PROJECT CONDITIONS:

- A The Subsurface Investigation Report is the basis for the design. The Contractor shall make note and comply with suggestions incorporated in the included Soils Engineering Reports relative to cut, fill, compaction, borrow material, removal of unsatisfactory material, maintenance of site drainage, etc., or other soils related conditions. Any conflicts or contradictions between the Subsurface Investigation Report and any portion of this specification, the conflict shall be brought to the attention of the Architect and clarified prior to proceeding with the work of this section.
- B Additional test borings and other investigatory operations may be undertaken by Contractor at the Contractor's option. However, no change in Contract Amount will be made for such operations.
- C Notify Owner's representative when excavations have reached required elevations. If it is determined that bearing materials are unsuitable, continue excavations until suitable bearing is encountered. Contract Amount may be adjusted by an appropriate Contract modification.
- D Locate, and where indicated to remain, protect and support existing utilities. If uncharted or incorrectly charted items are encountered, immediately notify utility company and cooperate with utility company's directives. Cooperate with Owner and utility companies in order to keep services and facilities in operation. Repair any damages caused by Work to the satisfaction of the affected utility company.
- E If utility service must be interrupted, give 72-hour notice to Owner's representative, and obtain written approval prior to such interruption.
- F Provide barricades and warning lights for open excavations. Operate warning lights as and when recommended by authorities having jurisdiction. Remove such protective items when no longer required.
- G Protect structures, utilities, sidewalks, pavings, and other facilities from damage due to settlement, lateral movement, undermining, washout, and other hazards resulting from earthwork operations.
- H Root systems of trees to remain are to be protected from damage or drying out; cover exposed roots with burlap.

PART II PRODUCTS

2.01 UNIT PRICES:

A The Contractor shall include on his Bid Form the following unit prices:

1. Unit Price per cubic yard for the removal of unsuitable soil in mass excavation and replacement with engineered fill.
2. Unit Price per cubic yard for the removal and disposal off site of rock in removed in general excavation.
3. Unit Price per cubic yard for removal and disposal off site of rock removed in trench excavation.
4. Unit Price per cubic yard for removal of unsuitable soil in trench excavation and replacement with compacted stone.
5. Unit Price per square yard for providing and installing geotextile fabric above and below foundation drainage stone.
6. Unit Price per ton for providing and installing foundation drainage stone

2.02 ALLOWANCES:

A The Contractor shall include in his Base Bid the following Allowances.

1. Allowance for the removal and disposal off site of 250 cubic yards of rock in mass excavation at the price quoted on the Bid Form.
2. Allowance for removal and disposal off site of 150 cubic yards of rock in trench excavation at the unit price quoted on the bid form.
3. Allowance for removal and replacement of 13,000 cubic yards of unsuitable soil in general excavation at the unit price quoted on the bid form.
4. Allowance for removal and replacement of 25 cubic yards of unsuitable soil in foundation trench excavation and replacement with compacted stone fill at the unit price quoted on the bid form.
5. Allowance for providing and placing 11,000 square yards of geotextile fabric above and below drainage stone in foundation excavation at the unit price quoted on the bid form.
6. Allowance for providing and placing 2,700 tons of #57 stone for drainage layer in foundation excavation at the unit price quoted on the bid form.

2.03 BURIED WARNING AND IDENTIFICATION TAPE:

A. Polyethylene plastic and metallic core or metallic-faced, acid and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read "CAUTION BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes:
Yellow: Electric

Yellow: Gas, Oil, Dangerous Materials
Orange: Telephone and Other Communications
Blue: Water Systems
Green: Sewer Systems
White: Steam Systems

- B. Warning Tape for Metallic Piping: Acid and Alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.04 BACKFILL MATERIAL:

- A Backfill material shall be a type that can be compacted to the densities specified under the conditions existing at the site at the time it is placed.
- B Stone for compacted backfill under slabs shall be evenly graded mixture of crushed stone or crushed or uncrushed gravel, with one hundred percent (100%) passing a 1-1/2" sieve and not more than five percent (5%) passing a No. 4 sieve.
- C Earth for compacted backfill and engineered fill shall consist of clean granular soils, clay soils, or shale soils having a plasticity index of less than 30 and a minimum density of 90 pounds per cubic foot when compacted to one hundred percent (100%) of its maximum dry density per standard proctor test. (ASTM D698) Material shall be free of vegetation, roots, rocks larger than 2" in any dimension, debris and other deleterious materials. Residual soil excavated at the site may be used for backfill if it meets the specification requirements. The moisture content of the fill soils should be maintained within +3 and -3 percentage points of optimum moisture content determined from the standard Proctor compaction test.
- D Cohesive soils that have become hard and lumpy or that have been piled and become dry shall be broken up and properly conditioned for optimum moisture content immediately before using as backfill. However, in no case shall earth backfill be wetted or puddled in place.
- E Backfill at retaining walls shall be ASTM #57 or 67 stone.

2.05 ENGINEERED FILL:

- A All fill in areas to be occupied by the buildings and paving, including an area 10 feet outside the perimeters thereof, and any areas noted on the site plan as "Future Expansion" shall be controlled (engineered) fill and the compaction shall be tested by the Special Inspector. Controlled fill in areas of buildings shall be compacted in thin lifts to at least 95% of maximum dry density within 3% of optimum moisture content in accordance with ASTM Specification D-698 (standard proctor). Fill in areas of asphalt paving shall be compacted in thin lifts to at least 90% of maximum dry density within 3% of optimum moisture content in accordance with ASTM Specification D 698. The upper 12 inches of fill beneath pavements and upper 24 inches beneath footings and grade slabs shall be compacted to one hundred percent (95%).
- B Where rock is excavated to 24 inches below footings, the footing excavations shall be refilled from top of rock to bottom of footings with controlled compacted fill.

2.06 UNDERCUT AT FOUNDATIONS:

- A Undercut and backfill with compacted stone at foundations shall be performed if directed by the Architect, based on the results of in place testing of earth at foundation subgrades. In areas where unsuitable soils are encountered at or near foundation level, the foundation shall be undercut to a depth and width of two times the foundation bearing level or to competent bearing soils. The trench shall be backfilled with compacted stone to the level of foundation bearing.

2.07 CLASSIFICATION OF EXCAVATED MATERIALS:

- A Materials to be excavated shall be classified as topsoil suitable for fine grading and planting beds, soil suitable for use in engineered fill, soil unsuitable for use in engineered fill, and rock.
- B It is understood that full compensation has been included in the Base Bid amount for all excavation work, including the furnishing and installing of all filling and backfilling materials required, except (1) the removal of rock (2) excavating and backfilling of areas of unsuitable soil (3) changes in the work made after award of the contract and (4) work required because of differing site conditions as defined hereinafter.

2.08 CLASSIFICATION OF EXCAVATED MATERIALS:

- A Materials to be excavated shall be unclassified. Excavating shall include the removal of all materials encountered, both natural and artificial.
- B It is understood that full compensation has been included in the Base Bid amount for all excavation work, including the furnishing and installing of all filling and backfilling materials required, the removal of rock and excavating and backfilling of areas of unsuitable soil except work required because of differing site conditions as defined hereinafter.

2.09 DIFFERING SITE CONDITIONS:

- A The Contractor shall promptly, and before such conditions are disturbed, notify the Architect in writing of: sinkholes or caves encountered in excavations.
- B The Architect and the Soil Engineer will promptly investigate the conditions, and if they find such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for performance of any part of the work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Contract modified in writing accordingly by a change order.
- C No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in Subparagraph A above; provided, however, the time prescribed therefore may be extended by the Owner.
- D No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under the Contract.

PART III EXECUTION

3.01 ROCK EXCAVATION:

- A Material to be excavated is assumed to be earth and other materials that can be removed by power shovel, power spade, backhoe, bulldozer, or other equipment normal to excavation work, but not requiring the use of explosives or drills. If rock, as herein defined, is encountered within the limits of excavation, the "Contract Price" will be adjusted. When the rock is encountered, the Contractor shall immediately notify the Architect and shall not proceed further until instructions are given and measurements made for the purpose of establishing volume of rock excavation. Quantities of unsuitable rock shall be determined from measurements made by the Contractor in the presence of the Special Inspector. Measurements shall be made by cross sectioning and determining depth of cut with a surveyor's level at periodic intervals, or by other methods mutually agreed upon by the Contractor and the Owner.
- B Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu.yd. for bulk excavation or 3/4 cu.yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the

following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator equivalent to Caterpillar Model No. 3201; equipped with a 42 inch wide, short-tip-radius rock bucket; rated at not less than 120 hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader equivalent to Caterpillar Model No. 973; rated at not less than 210 hp flywheel power and developing a minimum of 45,000 lbf breakout force; measured according to SAE J-732.

C Rock shall be stripped for measurement before excavating, and no rock excavated or loosened before measurement will be allowed or paid for as rock. Measurement and payment therefore, shall be by the number of cubic yards required to bring the excavation to the required surface or grade shown on the Drawings. The Owner may adjust the grades should excessive rock be encountered.

D Before placing concrete or masonry or rock surfaces, the surfaces shall be leveled off, or shelved, to a slope not exceeding one inch per foot.

E Payment for rock excavation, as defined above, shall be at the agreed unit price per cubic yard. (Computations will be made in a vertical plane from the lowest point rock is excavated).

F If the use of explosives is required or desired by the Contractor, the Contractor shall present written evidence of appropriate insurance, have written permission from the Architect and the authorities having jurisdiction prior to bringing explosives onto the job site or using in the work and shall implement all precautionary measures deemed necessary by the authorities having jurisdiction.

G If rock is encountered, it shall be excavated to the following limits:

1. Two feet outside of concrete work for which forms are required, except footings.
2. One foot outside the perimeter of footings and two feet below bottom of footings.
3. One foot below concrete floor slabs on grade.
4. In all pipe trenches, 6" below invert elevation of pipe and 2 feet wider than the inside diameter of the pipe, but not less than three feet trench width. Contractor shall notify officials prior to detonation of explosives or beginning noisy drilling operations.
5. In all other excavated areas: 2 feet below finished grade.

3.02 EXCAVATIONS:

A Excavation shall be to depth and of form and size required for installation of work shown on the drawings. Excavations for foundation walls shall be large enough to provide sufficient working space to permit the proper placing and inspection of forms, waterproofing, sleeves, and similar items, and the installation of foundation drains where such drains are shown. Excavation for slabs on grade shall be deep enough to allow for placing porous fill of depths specified under the slabs.

B Excavation for wall and column footings shall be to firm undisturbed earth or engineered earth fill, sides square and bottoms level. Changes in level of wall footings shall be made by stepping and not by sloping. Trenches, if excavated properly, may be used to maintain the concrete for all footings without the use of forms.

- C Excavations in earth for footings, slabs, walks, and other structures shall not be made to full depths required when freezing temperatures or rain may be expected. Concrete footings shall be placed immediately after excavation is completed. Freezing or water damaged excavations shall be carried deeper as required and backfilled as necessary at no additional cost to the Owner. The Soils Engineer shall observe all footing excavations immediately prior to placing reinforcing steel or concrete.
- D After excavating and rough grading building areas and areas to be paved which are in cut to the required subgrade elevations, and after topsoil has been removed from building areas and areas to be paved which are to receive engineered fill, these areas shall be proof-rolled by the Contractor in the presence of the Soils Engineer using a fully-loaded dump truck or similar pneumatic-tired equipment. Any areas exhibiting significant deflection, in the opinion of the Soil Engineer, shall be stabilized as directed prior to placing any fill. If areas exhibiting deflection cannot be stabilized by compaction, the unsuitable soil shall be undercut as directed by the Soil Engineer and replaced with engineered fill.
- E Any existing underground pipes or electrical conduits that are in service encountered during the excavation shall be temporarily supported and maintained until permanent support has been restored, or until other disposition has been made as directed by the Architect. Existing underground pipes encountered that have been abandoned or are to be abandoned shall be removed to a point outside the construction excavation and plugged.
- F All non-engineered fill shall be removed in the area of the new construction and replaced with engineered fill. All footing excavations shall be examined and approved by a senior engineering technician working under the direct supervision of a Geotechnical engineer immediately prior to placing reinforcing steel or concrete. Modifications shall be made to the excavation if the soils engineer determines that the excavation is not in compliance with the drawings or specifications.
- G In cut areas the excavation shall extend below any deleterious materials or unsatisfactory soil as specified.
- H Cut shall not be carried deeper than necessary to reach required elevations. Fill shall be clean earth as specified for backfilling. Fill shall be placed evenly over the entire area to be filled, in layers. Each layer shall be thoroughly compacted to a sufficient density to prevent unsightly settlement.
- I. Excavations in earth for footings, slabs, walks, and other structures shall not be made to full depths required when freezing temperatures or rain may be expected. Concrete footings shall be placed immediately after excavation is completed. Freezing or water damaged excavations shall be carried deeper as required and backfilled as necessary at no additional cost to the Owner.
- J. Foundation Bearing Materials Testing.
2. The Soils Engineer shall observe all footing excavations immediately prior to placing **reinforcing steel or concrete**.
- c. For foundations bearing on residual (natural) soils, the bearing materials shall be probed with a minimum ½ inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with dynamic cone penetrometer to verify the design bearing capacity. Test frequency shall be one cone penetrometer test per four individual foundations and per 100 linear feet of strip foundations.
- d. For foundations bearing on fill (under the present contract) soils, the bearing materials shall be probed with a minimum ½ inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with a nuclear density gauge to verify the in-place percent compaction conforms to the applicable compaction

criteria. Test frequency shall be one nuclear density test per four individual foundations and per 100 linear feet of strip foundations.

3.03 UNSUITABLE SOIL:

- A In building or paving areas where unsuitable soil conditions are encountered which cannot be stabilized by compaction, or where in the opinion of the Soil Engineer attempting stabilization by compaction would be unsuccessful, the unsuitable soil shall be excavated and removed from the site and the area backfilled with engineered fill specified hereinafter.
- B Quantities of unsuitable soil removed shall be determined from measurements made by the Contractor in the presence of the Special Inspector. Measurements shall be made by cross sectioning and determining depth of cut with a surveyor's level at periodic intervals, or by other methods mutually agreed upon by the Contractor and the Owner. When unsuitable soil is encountered the contractor shall notify the architect and not proceed further until instructions are given. Payment for unsuitable soil, as defined above, shall be made at the agreed unit price per cubic yard.

3.04 PAYMENT FOR EXCAVATION OF ROCK OR UNSUITABLE SOIL:

- A If rock or unsuitable soil is encountered, a change order will be issued to adjust the Contract Amount after all general excavation in building and paving area is complete.

3.05 PROTECTION OF EXISTING WORK AND LANDSCAPE FEATURES:

- A Excavating, filling, backfilling and grading shall be performed in such a manner and by such methods that will not damage existing structures, existing underground piping, existing over head wiring, existing trees (unless noted to be removed), and other landscaping planting.
- B Protect, maintain and restore benchmarks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed surveyor who shall furnish Architect with certification of his work.

3.06 PROTECTION OF EXCAVATION:

- A Excavation and grading operations shall be performed in a manner that will ensure positive and rapid surface run off of water away from the building area at all times.
- B Banks, slopes and adjacent structures shall be fully protected against harmful sluffing and erosion, by the use of shoring or other temporary construction, if necessary. The excavations shall be kept free of water by temporary dams or drains, pumping or other adequate means, until backfilling is completed.

3.07 STABILITY OF EXCAVATION

- A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

- B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
- D. Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

3.08 BACKFILLING:

- A. Excavation below the finished grade shall be backfilled after removing forms, shoring and similar temporary work and after waterproofing, piping, and other underground work has been installed, inspected and approved. Any caving of excavations or any backfill placed before inspections are completed shall be removed as the Architect may deem necessary.
- B. Material and compaction of backfill for excavations in controlled fill shall conform to requirements specified for controlled fill.
- C. Backfill material for use in areas to be seeded or planted shall be clean earth, free from large stones or rock fragments, large roots and debris, but may contain loam or similar organic matter. Backfill in these areas shall be compacted to a density that will prevent unsightly settlement after the finished grading is completed.
- D. All backfill, not otherwise specified, shall be deposited in layers not over 10" loose thickness and each layer shall be compacted by light compaction equipment as it is placed.
- E. Install porous backfill under concrete slabs on grade. Porous backfill thickness shall be not less than 4" under slabs. Where rock is excavated to 12 inches below concrete floor slabs on grade excavations shall be refilled from top of rock to bottom of slab with porous backfill.
- F. Finish grade shall slope away from the structure on all sides.
- G. After all turf, topsoil, roots, debris and other objectionable materials that would cause interference with the compaction of the fill have been removed, the area to be filled shall be scarified and broken to a depth of 8 inches. A thin layer, 3 inches thick, of the specified fill material shall be spread on the scarified base and the whole compacted as specified.
- H. The fill shall be formed of successive horizontal layers of 6 to 8 inches loose depth deposited in windows and machine spread. Each layer shall be compacted to the percentage of maximum density at optimum moisture content specified by means of sheeps-foot rollers, or other approved mechanical compacting machines. Where the fill is inaccessible to tamping rollers, it shall be consolidated and compacted by mechanical hand tampers.
- I. The Contractor shall maintain drainage and dryness so that there will be no undue saturation of the fill while the work is in progress. If an area becomes saturated, the Contractor shall remove all soft materials and scarify and recompact to the required density.
- J. Fill in areas other than those where controlled fill is specified shall be earth fill compacted to a density of approximately ninety-five percent (95%) standard proctor to prevent harmful or unsightly settlement of the finished grade, but need not be tested for specific percentage of compaction.

- K Additional fill dirt shall be taken from on-site or off-site locations as agreed to by the Architect. Any such borrow areas shall be smoothed and left finished with topsoil, fertilizer and seeded as per these specifications.

3.09 ROUGH GRADING:

- A Do all grading inside building to bring subgrade to proper level at underside of floor slab.
- B Do all grading outside the building required to bring the site to the finished grades indicated on the drawings. Subgrade in areas to be seeded and planted shall be brought to within 5" of finished grades.
- C Subgrades under walks and paved areas shall be brought to proper elevations at bottom of surfacing material to within two-tenths of one foot, plus or minus, of the required grades and profiles.
- D Grades not otherwise shown shall be uniform levels or slopes between points where elevations are given, or between such points and existing finished grades.

3.10 EXCAVATION FOR UTILITY TRENCHES:

- A Excavate trenches to indicated gradients, lines, depths, and elevations.
1. In the absence of a local code requirement or standard detail, beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B Excavate trenches to uniform widths to provide a working clearance on each side of pipe. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe, unless otherwise indicated.
1. Clearance: As indicated in standard detail or 12" minimum on each side of pipe if no detail is available.
- C Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes. Remove projecting stones and sharp objects along trench subgrade.
1. For ductile or cast iron pipe, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 2. For pvc or other flexible pipe provide 6" bedding layer of #57 stone.
 3. For all pipe, excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for #57 stone bedding course.

3.11 UTILITY TRENCH BACKFILL:

- A Place and compact bedding course on trench bottoms where indicated as fill area on plans. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B Backfill trenches excavated under footings and within 18 inches of bottom of footings with concrete to elevation of bottom of footings.
- C Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

- D For typical site installation of ductile or cast iron pipe, place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping to avoid damage or displacement of utility system. For pvc or other flexible pipe, backfill with #57 stone to 6" above top of pipe to provide complete stone envelope. Backfill to subgrade with #57 stone in all paved areas.
 - E Coordinate backfilling with utilities testing.
 - F Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
 - G Place and compact final backfill of satisfactory soil material to final sub grade.
 - H Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- 3.12 DISPOSAL OR SURPLUS MATERIAL AND VEGETATION:
- A Surplus dirt and rock not required for site improvements shall be removed from the site at the Contractor's expense and to a place of his choosing but only after the Architect has determined it cannot be used on the site. The Owner shall be given the opportunity to keep surplus dirt on site to use as he sees fit. Only after the Owner has stated that they do not wish to retain surplus dirt shall it be removed from the site.
 - B All vegetation, roots, trees, etc., are to be hauled away from the site and disposed of by the Contractor and at his expense.
 - C Placement of any materials listed in Paragraphs A & B above on any off-site location shall be done only after prior approval of the Owner of the land involved and it shall be the full responsibility of the Contractor and Owner of such land to agree on location, distribution and condition in which such materials are left.

End of Section

31 25 00 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Work shall include, but not be limited to temporary and permanent erosion control systems and slope protection systems.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.
- B. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents, including but not limited to the project Storm Water Pollution Prevention Plan (SWPPP).

1.02 SUBMITTALS

- A. Environmental Permit Requirements: Show compliance with all requirements of the Tennessee General NPDES Permit (TNR 100000) for Storm Water Discharges Associated with Construction Activity (CGP) and the project Storm Water Pollution Prevention Plan (SWPPP). Provide Architect and the local Tennessee Department of Environment and Conservation (TDEC) Environmental Field Office (EFO) with copies of all required paperwork during and at the conclusion of the project. The Contractor is responsible for all maintenance, inspections, record keeping, and reporting.

1.03 QUALITY ASSURANCE

- A. Personnel Qualifications: Inspections by the Contractor will be performed by personnel certified in the TDEC Level 1 Erosion Control Course.
- B. Performance: Protect adjacent properties and water resources from erosion and sediment damage throughout Work. Ensure compliance with applicable Federal, State, and local regulations related to erosion and sedimentation control.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials used for sediment and erosion control measures shall conform to the recommendations of the TDEC Erosion and Sediment Control Handbook, latest edition or the requirements of the local governing code agency; whichever is more stringent.
- B. See drawings for specific structural erosion control measures. The measures shown on the plans are a minimum. Contractor is to add, adjust and maintain structural controls as required to keep silt and dust from leaving the construction site.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine the Storm Water Pollution Prevention Plan (SWPPP) and the Site Erosion and Sedimentation Control Drawings.
- B. Notify Architect of deficiencies or changes in the SWPPP or Drawings required by current site conditions. Revisions of the Documents will be made as determined by the Architect.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to the Site Erosion and Sedimentation Control Drawings as well as the CGP and the SWPPP.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
 - 4. After final stabilization of the site, remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- B. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- C. Contractor shall limit where practical surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations. Contractor shall provide immediate permanent or temporary pollution control measures.
- D. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.
- E. Maintain temporary erosion control systems installed by Contractor to control siltation at all times throughout Work. Provide maintenance or additional Work within 48 hours of notification by Architect or other governing entities.
- F. Seed and mulch slopes that may be easily eroded. Application of temporary or permanent stabilization must be initiated within 14 days (7 days for slopes greater than 35%) to disturbed areas of a site where construction activities have temporarily or permanently ceased.

End of Section

SECTION 31 31 16 – TERMITE CONTROL

1PART I GENERAL:

1.01 SCOPE:

- A Furnish all labor, materials, tools, equipment, supervision, coordination, services, etc., required for complete execution of soil treatment for termite control as specified herein.
- B Furnish all labor, materials, tools, equipment, supervision, coordination, services, etc., required for complete execution of borate treatment for any new and existing structural wood members for termite control as specified herein.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS:

- A. Product Data: Submit general information, MSDS and EPA-Registered Label for all products.
- B. Product Certificates: For termite control products, signed by product manufacturer.
- C. Qualification Data: For Installer of termite control products.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.
- E. Wood Treatment Application Report: After application of borate is completed, submit report for Owner's record information, including the following:
 - 1. Date and time of application.
 - 2. Brand name and manufacturer of borate.
 - 3. Quantity of undiluted borate used.
 - 4. Dilutions, methods, volumes, and rates of application used.
 - 5. Areas of application.

1.04 QUALITY ASSURANCE:

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by bait-station system manufacturer to install manufacturer's products.
- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- C. Source Limitations: Obtain termite control products from a single manufacturer for each product.

1.05 PROJECT CONDITIONS:

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.06 COORDINATION:

- A. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.
- B. Apply borate treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

1.07 WARRANTY:

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

- 1. Warranty Period: **Five** years from date of Substantial Completion.

1.08 MAINTENANCE SERVICE:

- A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, and terms for agreement period; and terms for future renewal options.

2PART II PRODUCTS

2.01 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Termiticides:

- a. Aventis Environmental Science USA LP; Termidor.
- b. Bayer Corporation; Premise 75 / Centerfire 75 WSP.
- c. Dow AgroSciences LLC; Dursban TC orEquity.
- d. FMC Corporation, Agricultural Products Group; Talstar, Prevail FT, Torpedo.
- e. Syngenta; Demon TC.

- 2. Borates:

- a. Nisus Corp.; Bora-Care, Jecta.
- b. NovaGuard Technologies, Inc.; Armor-Guard, Shell-Guard.
- c. U.S. Borax Inc.; Tim-Bor.

2.02 SOIL TREATMENT:

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

2.03 WOOD TREATMENT:

- A. Borate: Provide an EPA-registered borate complying with requirements of authorities having jurisdiction, in an aqueous solution for spray application and a gel solution for pressure injection, formulated to prevent termite infestation in wood. Provide quantity required for application at the label volume and rate for the maximum diffusible borate concentration allowed for each specific use, according to product's EPA-Registered Label.

3PART III EXECUTION

3.01 GENERAL:

- A Perform application only after excavation, filling and grading operations are completed except as otherwise required in construction operations.
- B Do not perform soil treatment to frozen or excessively wet soil, or during inclement weather.

3.02 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
 - 1. Proceed with application only after unsatisfactory conditions have been corrected.

3.03 PREPARATION:

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.04 APPLICATION, GENERAL:

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.05 APPLYING SOIL TREATMENT:

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 4. Masonry: Treat voids.
 5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.06 APPLYING BORATE TREATMENT:

- A. Application: Mix wood treatment borate solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.
1. Framing and Sheathing: Apply borate solution by spray to bare wood for complete coverage.
 2. Wood Members Thicker Than 4 Inches (100 mm): Inject borate gel solution under pressure into holes of size and spacing required by manufacturer for treatment.

End of Section

SECTION 32 11 00 - HOT-MIXED ASPHALT PAVING

1PART I GENERAL

1.01 SCOPE:

- A Furnish all labor, material, equipment and services, including inspection, to install bituminous paving, wheel stops, pavement markings, and painted pavement signs for handicapped parking where shown on the drawings.

1.02 RELATED DOCUMENTS:

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

Section 31 20 00 Earthwork

1.03 SUBMITTALS:

- A Submit the following to the Architect of Record:
1. Pavement design analysis prepared by a licensed Professional Engineer using the design requirements above and the sub-grade modulus recommended within the geotechnical report.
 2. Laboratory reports of compaction tests and proof rolling of soil sub-grade.
 3. Pavement Surface Smoothness Tests.
 4. Approved pavement design mix.
- B Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

1.04 QUALITY ASSURANCE:

- A Comply with local City Highway Department standards for work in relation to city streets.
- B Comply with and perform all paving work in accordance with the Standard Specifications for Road Construction (latest edition) of the Department of Transportation (DOT) of the state in which the project is located and the Asphalt Institute "Specifications for Paving and Industrial Applications (SS-2), information series documents IS 91 and IS 87.
- C Design Requirements: (Based on 20 year life).
1. Daily Traffic: 1200 passenger vehicles, 10 single unit trucks, 2 multi-unit trucks.
- D Pavement to be designed and sealed by a professional engineer, using design requirements above and soil sub-grade modulus recommended by soil consultant.
- E Provide compaction tests of soil subgrade at not less than four locations around building in paving area prior to placing paving.
- F Obtain materials from same source throughout project.
- G Asphalt cement materials shall conform to ASTM D-3515.
- H At Architect's discretion "suspect" installation will be tested, at Contractor's expense for conformance to specifications by:
1. Using proper rolling equipment for: Breakdown, compaction and finishing

2. Extraction and gradation for compliance with approved job mix formula.
3. Non-complying installations will be replaced at the Contractor's expense.

I Pavement designs which differ from these indicated in this section must be accompanied with a letter from the design engineer certifying that the proposed design complies with the standards and specifications, of the applicable state Dept. of Transportation.

1.05 JOB CONDITIONS:

- A Establish grades, lines and elevations to drain water away from buildings, prohibit ponding and accommodate adjoining work and property.
- B Subgrade Conditions: Provide subgrade improvements as required to correct adverse conditions caused by permeability, frost potential and unstable soils.

1.06 GUARANTEE:

- A Contractor shall guarantee in writing, the materials and workmanship in accordance with Section 01010, for a period of two (2) years, beginning on the date of substantial completion or Owner's possession, whichever ever comes sooner. This provision also applies to concrete pavements..

2PART II PRODUCTS

2.01 MATERIALS:

- A Asphalt Aggregate Mix: Plant-mixed, medium volume, hot laid asphalt-aggregate mixture AC20 complying with ASTM D 3515 and as recommended by local paving authorities to suit project conditions.
Use AC 10 or AC20 for: Warm, mean annual air temperature between 7° C (45° F) and 24° C (75° F).
- B Aggregate Base Course:
1. Base course material shall consist of crushed limestone meeting the requirements of the State Department of Transportation. (DOT) for mineral aggregate base, Section 303, for Type "A" base, Class "A" aggregates, utilizing Aggregate Gradation "D".
- C Asphalt Binder Course:
1. The asphalt binder course shall meet the specifications of DOT, requirements for Bituminous Plant Mix Base. The aggregates for the mixture shall meet the requirements for Grading B Modified.
- D Finishing Course:
1. Hot-mix bituminous paving finish course shall meet the provisions of Section of DOT specifications.
 2. Bitumen content shall be adequate to produce durable, water repellent surfaces, but not so great as to create undesirable bleeding.
- E Tack Coat: Emulsified asphalt AASHTO M 140 or M 208: SS-1, SS1h, CSS-1, CSS-1h, diluted with one part water to one part emulsified asphalt. Apply to contact surfaces of previously constructed asphalt.

2.02 MISCELLANEOUS MATERIALS:

- A. Pavement Marking Paint: FS-TT-P-1952D (waterborne), Type II (adverse conditions), color: Highway white or yellow or as required by local codes.
- A. Wheel Stops: Wheel Stops: Recycled Rubber, approximately 4 inches high 6 inches wide, and 72" long, guaranteed against breakage for minimum of 10 years, with molded-in reflective yellow tape.

3PART III EXECUTION

3.01 SITE CONDITIONS:

- A. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40° F (4° C) and when base is dry. Base course may be placed when air temperature is above 30° F (-1° C) and rising.
- B. Grade Control: Establish and maintain required lines and elevations.
- C. Proof -roll and repair all unstable areas of the prepared subbase.

3.02 MATERIALS PLACEMENT:

- A. Do all additional grading and trimming required to bring subgrades to required elevations and profiles and compact thoroughly by rolling.
- B. Proof-roll prepared subbase surface to check for unstable areas and areas requiring additional compaction in the presence of the Architect.
- C. Over the properly prepared subgrade, install a crushed stone base to a compacted thickness of not less than 6" at Standard Paving and 8" at Heavy Duty Paving.
- D. Properly shape and thoroughly compact base course by rolling until the surface does not weave under the roller. Base shall be compacted to a minimum of 100 percent of its maximum dry density as determined by Standard Proctor Test ASTM D 698.
- E. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- F. Placing Mix:
 - 1. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225° F (107° C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
 - 2. Binder Course: After the base course has been properly prepared, apply a binder course of hot plant mix asphaltic concrete to a compacted thickness of not less than 2"(or to plans whichever is greater). Properly shape and thoroughly compact the binder course.
 - 3. Finish Course: Finish course shall be installed to a compacted minimum thickness as noted on the drawings or 1" at regular duty paving and 1-1/2" at heavy duty paving (or to plans whichever is greater). Properly shape and thoroughly compact finish course to a minimum of 92 percent of Maximum Theoretical Density (MTD).

Commented [JP1]: Added

Commented [JP2]: Added

4. Paver Placing: Place in strips not less than 10 feet side, unless otherwise acceptable to the Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
5. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
6. Joints: Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course.

G. Curbs: Construct concrete curbs over compacted binder course surfaces.

H. Place curb materials to cross-section indicated by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish.

I. Rolling:

1. General: Begin rolling when mixture will bear roller weight without excessive displacement.
2. Compact mixture with hot hand tampers or vibrating plate compactors in areas in accessible to rollers.
3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained a minimum of 92 percent laboratory density, maximum theoretical density as determined by ASTM D 2041.
6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.02 TRAFFIC AND LANE MARKINGS:

A Cleaning: Sweep and clean surface to eliminate loose material and dust.

B Do not apply traffic and lane marking paint until layout and placement have been verified with the Architect.

C Apply paint with mechanical equipment to produce uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum 10.3 mil wet thickness - 6.0 mils dry thickness. Lot striping shall be painted with 4" wide stripes.

1. Color to be White for standard striping.
2. Color to be Blue for handicapped parking symbols.
3. Color for fire lanes shall be coordinated with local Fire Department.

3.03 RUBBER WHEEL STOPS:

A Anchor to asphalt using manufacturer's installation methods and hardware.

3.04 FIELD QUALITY CONTROL:

- A Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
2. Base Course Surface: 1/4-inch.
 3. Wearing Course Surface: 3/16-inch.
 4. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4-inch.
- B Check surface areas at intervals as directed by the Architect.
2. Areas which pond water will be cut out and replaced with hot mixed asphalt.

End of Section

SECTION 321130 – BITUMINOUS PAVEMENT SEALING

1 PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, material, equipment and services to install bituminous pavement surface restoration system to all existing asphalt paving, on the property, which is to remain.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to all work specified under this section.

1.03 GUARANTEE:

- A. All areas sealed and restored are to be guaranteed during the one (1) year guarantee period. Any further deterioration of the restored paving during this time shall be repaired at the Contractor's expense.

2 PART II PRODUCTS

2.01 MATERIALS:

- A. All products used in pavement surface restoration shall be by a single source of supply and shall be of proven compatibility.
- B. Products shall be equal to: Butafill-Butyl-Asphalt Crack Sealer, Sof-Seal -Low Modulus Horizontal Sealant, and Gem-Seal-Coal Tar Bituminous Surface Treatment by 4765 Frederick Dr., Atlanta GA 30336, Ph.: (404) 696-7660.

3 PART III EXECUTION

3.01 INSTALLATION:

- A. Clean surface of paving by flushing with water under strong pressure while brushing with a stiff bristled broom to remove all dirt. Prevent any traffic from crossing surface from time cleaning is begun until installation is complete and dry.
- B. Remove loose debris from cracks prior to applying crack sealer or Horizontal Sealant
- C. Remove standing water and allow moisture to evaporate until surface is slightly damp, but not wet
- D. Fill cracks and surface voids as recommended by manufacturer.
- E. Paint over existing parking lot striping with one coat of Bituminous paint to conceal striping prior to applying surface treatment.
- F. Pour small amount of surface treatment onto surface, spread uniformly in as thin a coating as possible with a squeegee or dampened soft fiber push broom to achieve a coverage rate of 50 to 75 square feet per gallon. Scrub sealer into crevices and smooth out laps.
- G. Apply second coat in same manner as first coat as soon as first coat is thoroughly dry.

End of Section

SECTION 32 12 18 – HOT-MIXED ASPHALT PAVING REPAIR

1 PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, material, equipment and services, including inspection, to install bituminous paving where shown on the drawings.

1.02 RELATED DOCUMENTS:

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

Section	31 20 00	Earthwork
Section	03 30 00	Concrete

1.03 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

1.04 QUALITY ASSURANCE:

- A. Comply with City Highway Department standards for work in relation to city streets.
- B. Demonstrate drainage of finished paving to Architect through the application of sprayed water to verify complete drainage and the absence of “bird baths”.

2 PART II PRODUCTS

2.01 MATERIALS:

- A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.
- B. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- C. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt as required. ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt as required, slow setting, diluted in water, of suitable grade and consistency for application.
- D. Joint Sealant: ASTM D 6690 or AASHTO M 324, Type I hot-applied, single-component, polymer-modified bituminous sealant.
- E. Asphalt Binder Course: meet the specifications of TDOT, Section 307, Bituminous Plant Mix Base. The aggregates for the mixture shall meet the requirements for grading B Modified.
- F. Finishing Course:
 - 1. Hot-mix bituminous paving finish course shall meet the provisions of Section 411 (Grading E) of Tennessee Highway Department Specifications, 2006 Edition.
 - 2. Bitumen content shall be adequate to produce durable, water repellent surfaces, but not so great as to create undesirable bleeding.

- G. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type F; colors complying with FS TT-P-1952.
- I. Wheel Stops: As indicated on drawings. If not indicated, wheel stops shall be precast of 3,500 psi air-entrained, steel reinforced concrete, approximately 6 inches high 9 inches wide, and 7 feet long, with chamfered corners and drainage slots on underside.

3 PART III EXECUTION

3.01 SITE CONDITIONS:

- A. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40° F (4° C) and when base is dry. Base course may be placed when air temperature is above 30° F (minus 1° C) and rising.
 - 1. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
- B. Grade Control: Establish and maintain required lines and elevations.
- C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of [40 deg F (4.4 deg C) for oil-based materials] [55 deg F (12.8 deg C) for water-based materials], and not exceeding 95 deg F (35 deg C).

3.02 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Repairs: Remove paved areas that are defective or contaminated with foreign materials
 - 1. Pothole patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces by power-brooming. Ensure that prepared subgrade is ready to receive paving.

3.03 MATERIALS PLACEMENT:

- A. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.
- B. Repairs:
 - 1. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.
 - 2. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a minimum depth of 1/4 inch (6 mm) unless indicated otherwise on drawings.
 - a. Clean cracks and joints in existing hot-mix asphalt pavement.
 - b. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

- c. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Placing Mix:
 - 1. General: Machine place hot-mixed asphalt mixture on prepared surface, spread uniformly and strike off. Spread mixture at minimum temperature of 225° F (107° C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
 - a. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - b. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
 - 2. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt binder course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
 - a. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
 - 3. Finish Course: Finish course shall be installed to a compacted minimum thickness as noted on the drawings but not less than 1-1/2".
 - 4. Paver Placing: Place in strips not less than 10 feet side, unless otherwise acceptable to the Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
 - 5. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
 - 6. Joints: Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course.
- E. Joints: Ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

- F. Curbs: Construct concrete curbs over compacted binder course surfaces unless indicated otherwise on drawings.
- G. Place curb materials to cross-section indicated by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish.
- H. Rolling:
 - 1. General: Begin rolling when mixture will bear roller weight without excessive displacement.
 - 2. Compact mixture with hot hand tampers or vibrating plate compactors in areas in accessible to rollers.
 - 3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
 - 4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
 - 5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained a minimum of 92 percent laboratory density, maximum theoretical density as determined by ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
 - 6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
 - 7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
 - 8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.04 TRAFFIC AND LANE MARKINGS:

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Do not apply traffic and lane marking paint until layout and placement have been verified with the Architect.
- C. Apply paint with mechanical equipment to produce uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness. Lot striping shall be painted with 4" wide stripes.
 - 1. Color: White (Blue for Handicapped Parking Symbols)

3.05 PRECAST CONCRETE WHEEL STOPS:

- A. Secure wheel stops to pavement with galvanized steel dowels.

3.06 FIELD QUALITY CONTROL:

- A. Testing: If the Architect suspects that the paving does not conform to the thicknesses specified he may require up to six (6) test cores be taken in locations of his determination. If test cores indicate non-compliance with the specifications, the areas in nonconformance shall be replaced. If the initial tests indicate non-compliance with the specifications, additional test cores will be required. The number and location of tests to be as directed by the Architect. Patch all test core locations.
- B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:

1. Binder Course: Plus or minus 1/2-inch.
 2. Finish Course: Plus or minus 1/4-inch.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
1. Base Course Surface: 1/4-inch.
 2. Wearing Course Surface: 3/16-inch.
 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4-inch.
 4. Check surface areas at intervals as directed by the Architect.
- D. Conformance with Grades and Drainage: Compare paved surfaces to grades as shown on the Construction Documents. Surface shall conform with slopes indicated on the documents and shall be free draining with no impounded areas. Provide tape measure and construction level to verify slopes questioned by Architect. Provide water hose and water supply for drainage testing.

End of Section

SECTION 32 30 00 - PRE-ENGINEERED RETAINING WALL SYSTEMS

PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment, and supervision necessary to engineer, provide and install a Pre-engineered Concrete Segmental Retaining Wall System in accordance with these specifications and in reasonably close conformity with the lines, grades and dimensions shown on the plans or established by the Engineer.
- B. Scope of work shall include coordination with local jurisdictions for any required material approvals or test reports necessary for final acceptance and approval of the installation by authorities having jurisdiction.
- C. In general this section includes the following.
 - 1. Furnishing required submittals for approval.
 - 2. Furnishing structural geogrid as shown on the plans.
 - 3. Furnishing Segmental Concrete Facing Units and Connectors.
 - 4. Furnishing geosynthetic drainage composite and erosion control blanket as shown on plans.
 - 5. Storing, cutting and placing structural geogrid as specified herein and as shown on plans.
 - 6. Excavation, placement and compaction of wall unit fill and reinforced backfill material as specified herein and as shown on the plans.
 - 7. Erection of the facing units and placement of structural geogrid.

1.02 RELATED WORK

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

1.03 SUBMITTALS

- A. The Retaining Wall System supplier shall submit plans and specifications to the Engineer which have been sealed by a registered Professional Engineer licensed to practice in the project state for approval by the Engineer prior to construction.
- B. The Retaining Wall System supplier shall provide a certificate of Errors and Omissions Insurance to the Engineer with a minimum value of \$500,000 per occurrence. The Retaining Wall System design shall also be specific as to the type, length, and elevations of the geogrids used for design and shall be specific as to the type of segmental concrete facing required. The retaining wall system shall include a drainage system behind the reinforced backfill volume on the project plans whenever the maximum percentage of backfill material passing the no. 200 sieve exceeds 12%. The retaining wall system designer must include a reinforced, polymeric, permanent erosion control matting on all soil structures adjacent to the retaining wall.
- C. Provide written certification that structural geogrid is produced of virgin resin only.
- D. The system supplier shall submit samples of standard colors for the Architect's selection.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Structural Geogrid, Connectors, Geosynthetic Drainage Composite and Erosion Control Blanket.
 - 1. Check materials upon delivery to ensure that proper material has been received.
 - 2. Polymeric materials shall be stored above -20° F (-29° C).

3. Prevent excessive mud, wet concrete, epoxy and like materials from coming in contact with and affixing to polymeric material.
 4. Rolled polymeric material may be laid flat or stood on end for storage.
- B. Segmental Concrete Facing Units and High Performance Connectors
1. Contractor shall check the segmental concrete facing units and connectors upon delivery to ensure that proper materials have been received.
 2. Contractor shall prevent excessive mud, wet cement, epoxy and like materials from coming in contact with and affixing to the facing units.
 3. Contractor shall protect the facing units from damage (i.e. cracks, chips and spalls). Damaged units shall be evaluated for usage in the wall according to ASTM C90-75 (1981 Rev.) and ASTM C 145-75 (1981 Rev.).

PART II PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Pre-engineered retaining wall system shall be as manufactured by Tensar Earth Technologies – Atlanta Georgia, Versa-Lock – Latrobe Pennsylvania, or equal approved by Architect prior to bidding.

2.02 STRUCTURAL GEOGRIDS

- A. The geogrids shall be a regular polymeric grid structure manufactured of select high density polyethylene, polypropylene, or high tenacity polyester resin.
- B. The minimum allowable junction strength of the geogrid, as per GR1 GG2, shall be equal to or greater than the long-term design strength of the geogrid.
- C. The Retaining Wall System supplier shall provide certification of the ultimate strength and junction strength of the geogrid, based on testing in accordance with GG1 (or ASTM D-4595) and GG2.
- D. The Retaining Wall System supplier shall provide certification that ultimate strength of Geogrid per GG1 (or ASTM D-4595) is equal to or greater than the ultimate strength called for on plans.
- E. Structural geogrid shall be produced of virgin resin only.
- F. The Long Term Allowable Design Strength (T al) of the geogrid shall be no more that 23 percent of the ultimate strength (23% Tu) using GRI GG1 or the ASTM test method D-4595.

2.03 SEGMENTAL CONCRETE FACING WALL UNITS:

- A. The Concrete Facing Units shall consisted of the following units with the specified approximate weights which may vary slightly due to local raw materials:
1. Standard Unit (8 x 18 x 11): 75 lbs.
 2. Cap Unit (4 x 18 x 11): 40 lbs.
- B. The concrete facing units shall be connected to each other by a mechanical connection device(s) as described in Section 3.1C.
- C. Aggregates - Aggregates shall conform to the following specifications:
1. Normal Weight Aggregates - Specification C 33
 2. Lightweight Aggregates - Specification C 331

- D. Other Constituents: Air-entraining agents, coloring pigments, integral water repellents, finely ground silica and other constituents shall be previously established as suitable for use in segmental concrete retaining wall units and shall conform to applicable ASTM Standards or shall be shown by test or experience to not be detrimental to the durability of the segmental concrete facing units or any material customarily used in masonry construction.
- E. Physical Requirements: Segmental concrete facing units shall have a minimum compressive strength after 28 days of 4,000 psi. The concrete units shall have the required freeze/thaw protection with a maximum absorption rate of 6 percent by weight.
- F. Manufacture Tolerance: Segmental concrete facing units formed dimensions shall not differ more than (1/16 inch (1.6 mm) from the manufacturer's published dimension.
- G. Finish and Appearance
 - 1. All units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the construction. Minor cracks incidental to the usual method of manufacture or chipping resulting from shipment and delivery are not grounds for rejection.
 - 2. The exposed surfaces of the facing units shall be straight-split and free of chips, cracks or other imperfections when viewed from a distance of 10 feet under diffused lighting.

2.04 CONNECTORS

- A. Connectors shall be manufactured from high density polyethylene with fiberglass inclusions, fiberglass, or nylon. Segmental concrete retaining wall systems which do not utilize and incorporate approved connectors will not be approved for use on this project.
- A. Connectors shall be capable of mechanically transferring 200% of long-term design strength of Geogrid to facing units with a total displacement not to exceed that total displacement recommended by the Soils Engineer for each Retaining Wall.
 - 1. Connection strength testing shall be performed at a laboratory accredited and approved by the Geosynthetic Institute and certified to perform such testing.
 - 2. Connection strength testing shall be performed under a normal load of no greater than 5 psi and without unit fill encapsulated within the segmental concrete facing unit or placed behind the segmental concrete facing unit.
- B. Granular fill may be placed between segmental concrete facing units or to fill unique shapes in the tails of the segmental concrete facing units only.
 - 1. Seating load for the testing shall be no greater than 75 PLF per ASTM Z4278Z (Draft).

1.02 GEOSYNTHETIC DRAINAGE COMPOSITE

- A. Where required as shown on the plans, geosynthetic drainage composite shall consist of a 6 oz./sy polypropylene non-woven geotextile bonded to both sides of a polyethylene net structure.
- B. The minimum allowable transitivity as per ASTM 4716 shall be equal to or greater than 1.5 gal./min./ft width at a confirming pressure of 10,000 lb/ft² for a gradient of 1.0.
- C. The minimum allowable peel strength of geotextile from the genie as per ASTM F904-84 shall be equal to or greater than 250 gm/in width.
- D. The manufacturer shall provide certification of the transitivity as per ASTM 4716 and peel strength per ASTM F904-84.

1.03 EROSION CONTROL BLANKET

- A. Where required as shown on the plans, erosion control blanket shall consist of a lofty web of polyolefin fibers between two (2) high strength, bi-axially oriented nets and bound securely together by parallel stitching with polyolefin thread.
- B. Every component shall be inert to chemicals normally encountered in a natural soil environment and shall demonstrate a minimum 80% strength retained after 1,000 hours of UV exposure as determined by ASTM D-4355.
- C. The erosion control blanket shall have minimum tensile strength of 175 lb/ft x 100 lb/ft as demonstrated by ASTM D-1882 for a 2" strip.

1.04 BACKFILL MATERIALS

- A. Unit Fill - shall consist of well graded 3/4" minus crushed stone or granular fill meeting the following gradation requirements:

<u>Sieve Size</u>	<u>% Passing Unit Fill</u>
1 inch	100-75
3/4 inch	50-75
No. 4	0-60
No. 40	0-50
No. 200	0-5

- B. Reinforced Backfill - shall consist of granular fill meeting the following gradation requirements:

<u>Sieve Size</u>	<u>% Passing Unit Fill</u>
2 inch	100-75
3/4 inch	100-75
No. 4	100-20
No. 40	0-60
No. 200	0-35
pH Range	5-9

- C. Contractor shall furnish the Engineer with samples and gradation test results of potential reinforced backfill materials. The Engineer shall determine the suitability and acceptance of such reinforced backfill materials prior to construction.
- D. Recycled concrete meeting the gradation requirements may be used for reinforced backfill only with concrete retaining wall systems using - High Density polyethylene or polypropylene geogrid.
- E. All pH acceptance requirements for reinforced backfill shall be waived for Segmental Retaining Wall Systems using high-density polyethylene or polypropylene geogrid.

PART III EXECUTION

2.01 SUBGRADE PREPARATION:

- A. Subgrade shall be excavated as required for placement of leveling pad as shown on the construction drawings, or as directed by the Engineer.
- B. Subgrade shall be examined by the Engineer to insure that the actual foundation conditions meet or exceed assumed design assumptions. As a minimum, soil shall be proof-rolled before construction proceeds. Subgrade conditions not meeting the required strength shall be removed and replaced with acceptable material.

2.02 SEGMENTAL CONCRETE FACING UNIT INSTALLATION:

- A. Leveling Pad: Material for leveling pad shall consist of unreinforced concrete and shall be placed at the elevation(s) and to the dimension(s) shown on the construction plans.
- B. First course of concrete facing units shall be placed on top of and in full contact with leveling pad. Concrete facing units shall be checked for proper elevation and alignment.
- C. Concrete facing units shall be placed side by side for the full length of the wall. Proper alignment may be achieved with the aid of a string line or offset from baseline.
- D. High Performance Connectors shall be installed and the voids in and/or around the units filled with tamped unit fill.
- E. All excess material shall be swept from the top of the units prior to installing the next course.
- F. Concrete facing units shall be laid to create minimum radius possible, or as otherwise shown on drawings. Concrete facing units shall be installed such that only front face of units shall be visible.

2.03 STRUCTURAL GEOGRID INSTALLATION

- A. Geogrids shall be oriented within the highest strength axis perpendicular to the wall alignment.
- B. Geogrids shall be placed at the elevation(s) and to the length(s) shown on the construction drawings or as directed by the Engineer.
- C. Connect the Geogrid to facing units using the High Performance Connectors as shown on the construction plans.
- D. Geogrids shall be laid horizontally on compacted backfill. Place next course of facing units over Geogrid. The Geogrid shall be pulled taut and anchored prior to backfill placement on geogrid.

2.04 REINFORCED BACKFILL PLACEMENT

- A. Reinforced backfill shall be placed, spread and compacted in such a manner so as to minimize the development of slack in the geogrid.
- B. Reinforced backfill shall be placed and compacted in lifts not to exceed 6 inches where hand compaction equipment is used, or 10 inches where heavy compaction equipment is used.
- C. Reinforced backfill shall be compacted to 95% of the maximum density as determined by ASTM D-698. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum.
- D. Only lightweight hand-operated compaction equipment shall be allowed within 3 feet of the segmental concrete facing units.
- E. Tracked construction equipment shall not be operated directly on geogrid. Minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- F. Rubber tired equipment may pass over geogrid at slow speeds less than 10 mph. Sudden braking and sharp turning shall be avoided.
- G. At the end of each day's operation the Contractor shall slope the last lift of reinforced backfill away from the wall facing to rapidly direct runoff away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

End of Section

SECTION 32 31 13 – CHAIN LINK FENCE

PART I GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment, and supervision necessary to provide and install galvanized steel chain link fence where shown on the drawings and specified herein.

1. Galvanized Chain Link fencing with barbed wire anti-climber.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 03 30 00 Cast in Place Concrete

1.03 SUBMITTALS:

Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

- A. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, fabric, gates, and accessories.
- B. Shop drawings showing location of fence gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

1.04 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer who has at least three (3) years experience and has completed at least five chain link fence projects with the same material and scope to that indicated for the Project with a successful construction record of in-service performance.
- B. Single-Source Responsibility: Obtain chain link fence, gates, accessories, fittings, and fastenings from a single source.

1.05 WARRANTY:

- A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Faulty operation of gate operators and controls.
- b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 5 [Five] years from date of Substantial Completion.

1.06 PROJECT CONDITIONS:

- A. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the completed structures. Verify dimensions by field measurements.

PART II PRODUCTS

2.01 MANUFACTURER:

- A. Fencing shall be Page Chain Link Fencing as manufactured by Page Fence Division, American Chain Link Fence, Southeastern Wire, or approved substitute.

2.02 STYLE:

- A. Fence shall be constructed of galvanized steel chain link fabric on galvanized steel framework.

2.03 FABRIC:

- A. Galvanized Chain Link Fabric :

1. Fabric shall be knuckled on top selvage and twisted on the bottom selvage with 2 inch mesh of 9 gauge (0.148 inch) wire.
2. Fabric shall be finished as follows: ASTM A 817, Type 2, class 2 zinc coated (galvanized).
 - a) Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.

- B. Fabric Height: 8'-0".

2.04 FRAMEWORK:

- A. Posts and Other Appurtenances: All posts and other appurtenances used in the construction of this fence shall be Type II round posts; cold-formed, electric-welded steel pipe conforming to heavy industrial requirements of ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:
1. Group IC, with minimum yield strength of 50,000 psi.
 2. Strength Requirement: Heavy Industrial according to ASTM F 1043.
 3. Post Diameter and Thickness: According to ASTM F 1043.
 - a. Top, and intermediate Rail: 1.66 inches. Manufacturer's longest lengths (17 to 21 feet) with swedged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull and end post.
 - c. Line Post: 2.375 inches.
 - d. End, Corner and Pull Post: 2.875 inches.
 - e. Swing Gate Post: According to ASTM F 900.
 4. Coating for Steel Framing:
 - a. Metallic Coating:
 - i. Type A, consisting of not less than minimum 2.0-oz./sq.ft average zinc coating per ASTM A 123/A or 4.0-oz./sq. ft. zinc coating per ASTM A 653.
 - ii. Polymer coating over metallic coating at fence at Vinyl Coated Chain Link Fabric.

- iii. Color: As selected by Architect from manufacturer's full range, complying with ASTM F 934.
- B. Post Spacing: Posts shall be evenly spaced in the line of fence no further apart than 10 feet on center.
- C. Bottom tension wire: Polymer-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, tension wire complying with ASTM F 1664, Class 2b over Zn-5-Al-MM-alloy-coated steel wire.
 - 1. Color: Color to match fence fabric, complying with ASTM F 934.
- D. Tie Wires: 0.166 inch (12-gauge) finish to match fence fabric.
- E. Braces: Brace pipe shall be 1.660 inch o.d. Type II steel pipe, Type C coating inside and outside, weight 1.84 pounds per foot and shall extend from the terminal post to the first adjacent line post. Braces shall fasten to posts by malleable steel fitting.
- F. Tension or Stretcher Bars: Hot dip galvanized steel with a minimum length 2 inches less than the full height of fabric, a minimum cross section of 3/16 inch by 3/4 inch and a minimum of 1.2 oz. of zinc coating per sq. ft. Provide one bar for each gate and end post, and two for each corner and pull post.
- G. Tension and Brace Bands: 3/4 inch wide, 11 gauge, minimum hot dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft.
- H. Post and Line Caps: Provide weathertight closure cap for each post cap with loop to accept top rail.
- I. Top Rail: 1.66 inches in diameter. Manufacturer's longest lengths (17 to 21 feet) with swaged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull and end post.
- J. Barbed Wire Arms: Pressed steel or cast iron with clips, slots, or other means for attaching strands of barbed wire, integral with post cap; for each post unless otherwise indicated, and as follows:
 - 1. Provide line posts with arms that accommodate top rail or tension wire.
 - 2. Provide corner arms at fence corner posts, unless extended posts are indicated.
 - 3. Type I, single slanted arm.

2.05 GATES:

- A. General: Comply with ASTM F 900 for gate posts and single or double swing gate types as indicated on the drawings.
 - 1. Gate Leaf Width: As indicated.
 - 2. Gate Fabric Height: As indicated to match fence height.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing
 - 2. Gate Posts: Round tubular steel.

- 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame **12 inches (300 mm)** to attach barbed wire assemblies.
- E. Hardware:
 - 1. Hinges: 360-degree inward and outward swing.
 - 2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.06 MISCELLANEOUS FITTINGS:

- A. Furnish all fittings necessary to make a complete installation.

PART III EXECUTION

3.01 EXAMINATION:

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet (152.5 m)** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.03 INSTALLATION, GENERAL:

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
 - 1. Install fencing on established boundary lines inside property line.

3.04 CHAIN-LINK FENCE INSTALLATION:

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in

- position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Concealed Concrete: Top **2 inches (50 mm)** below grade to allow covering with surface material.
 - C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more.
 - D. Line Posts: Space line posts uniformly at **96 inches (2440 mm)** o.c.
 - E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
 1. Locate horizontal braces at midheight of fabric **72 inches (1830 mm)** or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
 - F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with **0.120-inch- (3.05-mm-)** diameter hog rings of same material and finish as fabric wire, spaced a maximum of **24 inches (610 mm)** o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
 1. Extended along bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within **6 inches (152 mm)** of bottom of fabric and tie to each post with not less than same diameter and type of wire.
 - G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
 - H. Intermediate Rail: Install and secure to posts with fittings.
 - I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave **1 inch (25.4 mm)** between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
 - J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than **15 inches (380 mm)** o.c.
 - K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 1. Maximum Spacing: Tie fabric to line posts at **12 inches (300 mm)** o.c. and to braces at **24 inches (610 mm)** o.c.
 - L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

- M. Barbed Wire: Install barbed wire uniformly spaced , angled toward security side of fence. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

3.05 GATE INSTALLATION:

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.06 ADJUSTING:

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

End of Section

SECTION 32 92 00 – SEEDING

PART I GENERAL

1.01 SCOPE:

- A. The work covered by this Section consists of furnishing all labor, equipment and materials required to place seed, commercial fertilizer, agricultural limestone and mulch material, including seed bed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and shown on the Drawings. In general, seeding operations shall be conducted on all barren areas not covered by structures or pavement; all cleared or grubbed areas which remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces.
- B. The General Contractor shall be responsible for placing all topsoil on the site to within finish grade. The Landscape Contractor shall be responsible for finish grading, seeding and other operations as herein specified.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 QUALITY ASSURANCE:

- A. Prior to seeding, the Contractor shall furnish to the Architect labels or certified laboratory reports showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.

1.04 PROJECT CONDITIONS:

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations.
- B. Perform seeding work only after grading and other work affecting ground surface has been completed.
- C. Restrict traffic from lawn areas until grass is established.
- D. Provide hose and lawn watering equipment as required.

1.05 WARRANTY:

- A. Provide a uniform stand of grass until the end of the Warranty Period, which is a period of one year from Acceptance of Work by the Owner. Any areas which are designated by the Architect as being unacceptable shall be re-seeded as specified herein until an acceptable stand of grass is established.

PART II PRODUCTS

2.01 SEED:

- A. Seed shall be delivered in new bags or bags that are sound and labels in accordance with the U.S. Department of Agriculture Federal Seed Act.
- B. All seed shall be from the last crop available at the time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.

- C. Seed shall bear growers analysis testing to a 95% minimum purity and 90% minimum germination.
- D. Species, rate of seeding, fertilization and other requirement are shown in the seed requirements table:

SEED REQUIREMENTS TABLE
(Rate per 1000 sq. ft.)

<u>Area</u>	<u>Seed Type</u>	<u>Seed Quantity</u>	<u>Fertilizer</u>	<u>Fertilizer Quantity</u>
Lawn Areas	Kentucky 31 Fescue	5 lbs.	10-10-10	40 lbs.

2.02 FERTILIZER:

- A. Container bags shall have the name and address of manufacturer, brand, name weight and chemical composition. Containers shall insure proper protection in handling, transporting and storing the fertilizer.

2.03 LIMING:

- A. Limestone shall be a pulverize limestone having a carbonate content of not less than 85% by weight. The limestone shall be crushed so that at least 85% of the material passes a No. 10 mesh screen and 50% passes No. 40 mesh screen. Apply at a rate of 135 lbs. per 1000 sq. ft.

2.04 MULCH:

- A. Mulch shall be one of the following used at the specified rate:

1. Wood Cellulose Fiber 1,500 lbs. per acre
2. Straw 4,000 lbs. per acre

2.05 WATER:

- A. Free of substance harmful to seed growth. Furnished by Contractor. Hoses or other methods of watering furnished by Contractor.

2.06 EROSION CONTROL BLANKET:

- A. Wood excelsior blanket reinforced with a photo-degradable plastic grid similar and equal to Curlex Excelsior blanket by the American Excelsior Company or approved equal.

PART III EXECUTION

3.01 SEED BED PREPARATION:

- A. Before fertilizing and seeding, the surfaces shall be trimmed and worked to true line free from variation, bumps, ridges and depressions, and all foreign materials including roots, rocks and debris removed.
- B. The soil surface to be seeded shall be thoroughly cultivated to a minimum depth of 4 inches with a weighted disk, tiller or other equipment.
- C. If the prepared surface becomes eroded, compacted, or wet due to rain or other occurrence, the surface shall be re-cultivated prior to seeding.
- D. Ground preparation operations shall be preformed only when the ground is in a tillable and workable condition, as determined by the Architect.

- E. Allowance for settlement shall be made.

3.02 FERTILIZER AND LIMING:

- A. Following seed bed preparation, fertilizer and lime shall be incorporated at the rates specified herein in the top 2 inches of the soil by disking or other measure.
- B. Fertilizer need not be incorporated in the soil when hydro-seeding is used in seeding operations.

3.03 SEEDING:

- A. Examine finish surfaces, grades, topsoil quality and depth. Do not start seeding work until unsatisfactory conditions are corrected.
- B. Seed of the specified group shall be sown as soon as the seed bed preparation is complete. Do not seed during windy conditions.
- C. Seeds shall be uniformly sown by approved mechanical method, preferably a broadcast type spreader. Hydro-seeding is an acceptable method of distribution of seed and fertilizer.
- D. Immediately after sowing by mechanical means, the seed shall be lightly with soil covered by a cultipacker or roller.

3.04 MULCHING:

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. Approximately twenty five percent (25%) of the ground surface shall be visible through the mulch blanket. Mulches shall be applied at the rates as specified herein.

3.05 WATERING:

- A. Contractor shall be responsible for watering the seeded areas until a satisfactory stand of grass is obtained. Watering shall be done with sprinklers in such a manner as not to cause excessive runoff or erosion.

3.06 INSTALLATION OF EROSION CONTROL BLANKET:

- A. Install erosion control blanket on all slopes steeper than 3 run to 1 rise. Install blanket after seed has been placed. Apply blankets vertically to slopes butt ends and sides. Fasten

3.07 HYDROSEEDING:

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
 - 1. Mix Slurry with non-asphaltic tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.08 MAINTENANCE:

- A. Contractor shall submit typewritten instructions (prior to acceptance) recommending procedures to be established by the Owner for the maintenance of lawns for one full year.
- B. Maintain seeded lawn areas, including watering, spot weeding, mowing, applications of herbicides, fungicides, insecticides, and re-seeding until a full, uniform stand of grass free of

weeds, undesirable grass species, disease and insects is achieved and accepted by the Architect.

1. Water daily to maintain adequate surface soil moisture for proper seed germination. Continue daily watering for not less than thirty (30) days. Thereafter apply 1/2" of water twice weekly until acceptance.
 2. Repair, rework and re-seed all areas that have washed out, are eroded, or do not catch.
 3. Mow lawn areas as soon as lawn top growth reaches a 3" height. Cut back to 2" in height. Repeat mowing as required to maintain specified height.
- C. Maintain seeded banks, ditches, medians and fields to the extent of establishment only. Re-grade and re-seed washed out or eroded areas as required until a suitable cover is established.

3.09 SUBSTANTIAL COMPLETION:

- A. An inspection of the seeded lawns will be made by the Architect upon request for Application of Substantial Completion by the Contractor
- B. Seeded areas will be acceptable provided all requirements, including maintenance have been complied with, and a healthy, uniform close stand of specified grass is established free of weeds, undesirable grass species, disease and insects.
- C. No individual lawn areas shall have bare spots or unacceptable cover totaling more than two percent (2%) of the individual areas, in areas requested to be inspected.

3.10 CLEANING:

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from seeding operations.

End of Section

SECTION 32 93 00 – LANDSCAPING

1PART I GENERAL

1.01 SCOPE:

- A This section includes furnishing all materials, equipment, and labor necessary for placement of topsoil in all planting areas including backfilling of curbs, walks, and around building, soil treatment; planting of trees, shrubs and vines; protection, maintenance, guarantee and replacement of plants. All existing landscaping to remain shall have weeds removed and shall be mulched.
- B Before commencing any work required by this section, the Landscape Contractor shall ascertain the location of all utilities, subsurface drainage and underground construction so that proper precautions may be taken not to disturb or damage any subsurface improvements. This Contractor will be held responsible for making, at his own expense, all repairs to damaged utilities resulting from the work hereunder.

1.02 RELATED DOCUMENTS:

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 32 92 00 Seeding

1.03 QUALITY ASSURANCE:

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
 - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 - 2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 - a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
 - b. Certified Ornamental Landscape Professional, designated COLP.
- B General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
- C Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability from a minimum of six suppliers to the Designer, together with proposal for use of equivalent material.
- D Analysis and Standards: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
- E Topsoil: Before delivery of topsoil, furnish Designer with written statement giving location of properties which topsoil is to be obtained. Submit laboratory proof of minimum 5% organic matter content in topsoil.
- F Trees, Shrubs and Plants: Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work complying with the requirements of ANSI Z60.1

"American Standard for Nursery Stock", and American Association of Nurserymen Standards for Nursery Stock, current edition. Such standards will be considered as MINIMUM ACCEPTABLE and Contractor will be expected to provide plants which can be considered to have a quality which is higher than minimum acceptable.

- G Inspection: The designer may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Designer retains the right to further inspect trees and shrubs for size and condition of root ball, insects, injuries and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Rejected material must be immediately removed from the project site.

1.04 SUBMITTALS:

- A Certification: Submit certificates of inspection as required by governmental agencies. Submit manufacturer's certified analysis for soil amendments and fertilizers.
- B Planting Schedule: submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- C Maintenance Instruction: Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A All plants shall be packed, transported and handled with the care necessary to insure protection from injury. Plants shall be handled by their root zones only. They must not be dropped, thrown or otherwise roughly handled. All broken or damaged root balls, damaged containers or injured plants shall be rejected.
- B Plants in transport shall be fastened and secured in a manner that does not damage plant. Plants shall be protected from freezing, overheating, or excessive transpiration. All plants must be transported in a closed or tarp-covered vehicle or an open vehicle traveling less than 35 miles per hour. Anti-desiccant is permitted if used according to manufacturer's direction. The use of such a product does not constitute protection from heat, cold or wind.
- C Interim Storage: Plants not installed immediately upon their arrival at the site shall be stored in the proper manner as follows:
 - 1. Balled and burlapped plants must be heeled in a trench which allows contact of roots to soil or mulch. Bare roots must be covered with a layer of mulch.
 - 2. All plants shall be protected from wind and excessive sun by the use of moist burlap or other such barrier. Roots shall never be exposed to freezing, excessive heat or harsh winds.
 - 3. Bare-root, balled and burlapped, and container plants shall be watered daily in hot weather and frequently during cold weather. Machine balled plants shall be kept moist but never waterlogged.

1.06 PROJECT CONDITIONS:

- A Proceed with complete landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.
- B Utilities: Determine the locations of underground and overhead utilities and perform work in a manner to avoid possible damage. Repair to utilities, if damaged, shall be the responsibility of the Contractor at his expense.
- C Report of Unfavorable Conditions: The Contractor shall notify the Designer of adverse soil drainage conditions, discrepancies in sub-grade elevations, or other situations unfavorable for Landscape

installation. He shall do no additional work, except at his own risk, in such an area until the problem has been reviewed by the Designer and resumption of work is authorized.

- D Report of Obstructions to Work: In the event that plants have been inadvertently located in the plan too close to a utility or other obstruction, the Contractor shall notify the Designer in order for relocations of plant material to be determined.
- E Protection of Site from Damage: The Contractor shall provide at his own expense, protection against trespassing and damage to seeded areas, planted areas and other construction areas until the Provisional Acceptance. He shall provide barricades, temporary fencing, signs, written warning or policing as may be required to protect such areas.
- F Protection and Replacement of Existing site Features: It shall be the Contractor's responsibility to locate and protect all existing above and below ground utilities. The Contractor shall be responsible for the protection of crowns, trunks and roots of existing trees, shrubs, lawns, paved areas, structures and other existing landscaped areas that are to remain.
 - 1. Existing trees which may be subject to construction damage shall be boxed, fenced or otherwise protected before any work is started. Boxing or other protection will be removed at the end of construction. Do not locate heavy equipment or stockpiles within the drip-line of existing plants, or on lawns.
- G Water: Water shall be clean, clear water free from objectionable or harmful chemical qualities or organisms. Contractor shall verify location of water on the site and shall make arrangements and furnish equipment to convey water to planted areas.

1.07 GUARANTEE AND MAINTENANCE:

- A All plant material and other landscape work including lawns shall be guaranteed by the Contractor for a period of one year beginning on the date of Provisional Acceptance. Plant materials including trees, shrubs, grassed areas and perennials shall have acceptable appearance, be alive and healthy and exhibit vigorous normal growth. Upon notice by the Designer, the contractor shall replace, without cost to the Owner, and as soon as weather conditions permit, all unacceptable plants.
 - 1. Replacements shall match adjacent specimens of the same species and shall conform to the standards for plant materials specified. All replaced material shall immediately be removed from the site and all necessary repairs to plants, grades, lawn areas, paving, and other areas damaged during replacement shall be made at no cost to the Owner.
 - 2. When Work is provisionally accepted in parts, the guarantee period extends from each Provisional Acceptance date to the terminal date of the last Guarantee Period. Thus, all Guarantee Periods terminate at the same time.
 - 3. If the replacement is not acceptable during or at the end of the Guarantee Period, the Owner may elect either subsequent replacement or credit. Replacements shall have a similar one-year Guarantee from the date of replacement.
 - 4. Guarantee applies to losses other than those due to Acts of God, vandalism, or Owner neglect, as determined by the Owner.
- B Maintenance Period: Contractor shall provide all maintenance (including watering) for the landscape work (including grassing) during construction and for one year after Provisional Acceptance of the Work.

1.08 INSPECTIONS:

- A Interim Inspections: Inspections will be made during the progress of the work to check compliance with the plans and specifications during construction.
- B Punch List Inspection: When work has been substantially completed, contractor shall notify the Designer that work is ready for Punch List Inspection. The Designer, within reasonable time, will check work and prepare Punch List stating observed deficiencies of work which need correction prior to Provisional Acceptance Inspection. Punch List is for Contractor's convenience and shall not relieve

him of any obligations of Contract. All items on the punch list shall have been attended to, prior to Provisional Acceptance Inspection(s).

- C Inspection for Provisional Acceptance of Work: Shall occur upon completion of final recommendations submitted by the Designer after the Punch List Inspection. Contractor shall notify the Designer 7 days in advance of anticipated date of the Provisional Acceptance Inspection. At this inspection all requirements on the Contract Documents must be satisfactorily completed. If work is unacceptable and additional inspection is required, Contractor shall reimburse Owner for additional expenses charged by the Designer for re-inspection and Owner shall deduct such amount from payment to Contractor
- D Inspection for Final Approval: To occur at end of Guarantee Period. At the end of the Guarantee period, the Designer will make a final inspection. Upon completion of all repairs or renewals which may appear at that time to be necessary, the Designer shall certify in writing to the Owner the Final Acceptance of the project.

2PART II PRODUCTS

2.01 SOIL:

- A Topsoil: Shall be natural, fertile, agricultural soil, capable of sustaining vigorous plant growth. It shall be of uniform friable clay loam composition throughout, without admixture of subsoil. Soil shall be free of stones, lumps, live plants and their roots, sticks and other extraneous matter. The soil shall not be contaminated with substances harmful to the growth of plants and humans. It shall have a pH range of 5.0 to 7.0, and contain not less than five percent (5%) organic matter. The topsoil shall be free of noxious weeds, grasses or other foreign vegetation which would cause maintenance problems for the Owner after the contract is complete. Contractor shall assume full responsibility for control of noxious species introduced by the addition of soil infested with such species for a period of one year from Provisional Acceptance of the Work.
- B Backfill soil: Shall consist of topsoil mixed with amendments as specified in the detail drawings.
- C Any stored topsoil remaining after all work is in place shall be disposed of by the Contractor.

2.02 SOIL AMENDMENTS:

- A Lime: Natural limestone containing not less than eight five percent (85%) of total carbonates, ground so that not less than ninety percent (90%) passes a 10-mesh sieve and not less than fifty percent (50%) passes a 100-mesh sieve. Provide lime in the form of dolomitic limestone meeting the specified requirements. Do not apply lime in areas where acid-loving plants are installed.
- B Organic Amendments: Shall consist of finely milled black Michigan Peat or other organic compost approved by the Designer. See graphic details for application rate and method.
- C Superphosphate: Soluble mixture of treated minerals, 20% available phosphoric acid.
- D Sand: Clean, washed sand, free of toxic materials. Manufactured limestone sand is not acceptable. See graphic details for application rate and method.
- E Commercial Fertilizer: complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients:
 - 1. For trees and shrubs, provide fertilizer with not less than 10% total nitrogen, 10% available phosphoric acid and 10% soluble potash and including trace elements. The use of a slow release product is recommended. Apply per manufacturer's recommendations.

2.03 MULCHES:

- A Mulch shall be shredded hardwood bark unless otherwise specified on the materials list. Mulches shall be free from matured seed, noxious weeds, egg cases, harmful insects, or any species or chemical

detrimental to the development of plants and humans. contractor shall assume full responsibility for control of noxious weeds introduced on the site in the mulch for a period of one year after Provisional Acceptance of the Work. Mulches shall exhibit uniform texture, color and particle size. Submit sample for approval prior to placing mulch.

2.04 MATERIALS FOR PLANT SUPPORT AND PROTECTION:

- A Plants to be staked and acceptable methods of staking are described herein. Tree stakes and guy stakes shall be pressure treated pine with minimum uniform cross-section of 2 x 2 inches nominal dimension, capable of withstanding above ground and underground conditions until Final Acceptance. Metal tree anchors manufactured specifically for this purpose may be used.
- B Lumber lengths shall be as specified herein. Guy wires shall be of 12 gauge or comparable strength, malleable, galvanized annealed wire.
- C Wires shall not come in contact with plant, but shall be covered with rubber hosing at point of contact. Hosing shall be two-ply, 1/2 inch minimum diameter reinforced rubber hose or approved comparable, non-injurious product of a length sufficient to properly protect trunk.
- D Commercial tree wrapping product shall be of bituminous impregnated tape, heavy crepe paper, or other approved material 4 to 12 inches wide. Twine shall be not less than 2-ply jute twine or comparable non-metallic material of neat, inconspicuous appearance. Contractor shall submit samples of above materials for approval to Designer.
- E Weed Barrier Fabric: Provide black polypropylene sheet 28 mils thick, grab tensile strength per ASTM D-4632; 179LB (machine direction) 108 lbs (cross machine direction)

2.05 PLANT MATERIALS:

- A Plant List: A complete list of plants, including a schedule of quantities, sizes and other requirements, is shown on the drawings.
- B Quality: Plants shall have a habit of growth that is normal for the species and shall be sound, healthy and free from disease, insect pests, mechanical injuries, defects, disfiguring knots, abrasions of the bark, and sunscald injuries. Plants shall stand straight and plumb in their natural position and shall be heavily and well branched in the manner of any high quality specimen of its species. During the appropriate season, plants shall exhibit healthy and full foliage. All plants shall be nursery grown from stock that has proven hardy to the location of this project. Plants shall have been growing under similar climactic conditions as the location of this project.
- C Nomenclature: The names of plants required shall conform generally with names accepted in nursery trade, but authority in case of dispute shall be Standardized Plant Names, Second Edition, American Joint Committee on Horticultural Nomenclature, 1942, J. Horace McFarland Company, Harrisburg, Pennsylvania.
- D Measurement: Plant size, grading standards and methods of measurement shall conform to those of the American Standard For Nursery Stock, American Association of Nurserymen, 230 Southern Building Washington, D.C., 20005, 1980 unless otherwise specified. All plants shall be an approximate average between the minimum and maximum dimensions cited on the plant list including: stem height, caliper, average spread of foliage, root spread and minimum number of stems. A plant shall be measured before pruning as it stands in its natural position. Height and spread specified refer to the main body of the plant and not to the distance from tip to tip of branches or roots.
- E Sod: Provide strongly rooted sod not less than 2 years old, free of weeds and undesirable native grasses and machine cut to pad thickness of 3/4" (+/- 1/4"), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).
- F Provide sod of uniform pad sizes with maximum 5% deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10% of pad will be rejected.

1. Provide sod as shown on the drawings.
2. Turfgrass Species: Sod of grass species as specified, with not less than 95% germination, not less than 85 percent pure seed, and not more than 0.5% weed seed:

3PART III EXECUTION:

3.01 FINISH GRADING:

- A All areas where existing grass lawn cover is damaged or disturbed by construction operations areas indicated on the site plan to be grass shall be surfaced with topsoil not less than 5" thick after compacting
- B If the previously stockpiled topsoil is not sufficient to cover the areas as specified, the Contractor shall furnish additional topsoil obtained from other sources. Topsoil obtained from other sources shall be clean, friable loam free from objectionable weed seeds.
- C Finished grades shall slope away from the building in all cases and shall contain no sinks or dams. Hand trim and rake topsoil to finished grades and leave ready for seeding or planting.
- D Minimum permitted slope on site shall be 1.5% to insure positive drainage.

3.02 PREPARATION FOR PLANTING:

- A Layout and Staking: Layout individual tree and shrub locations and areas for mass plantings. Stake locations and outline areas and secure Designer's acceptance before start of planting work. Make minor adjustments as may be requested. Contractor shall immediately notify Designer if structural changes in paving or other site construction are different from the plans and would cause a change in the location of any plants.
- B Planting Pit and Bed Preparation: No plant pits shall be dug or prepared until their location is approved by the Designer. Holes for shrubs and trees shall be dug as shown on the planting details.
 1. Topsoil for backfilling shall be kept separate from excavated subsoil. Excess subsoil from planting areas shall be kept separate from excavated subsoil. Excess subsoil from planting areas shall be removed from the site unless otherwise directed.
 2. All existing sod remaining in areas shown to be planted, shall be sprayed, stripped and removed from the site. Following manufacturer's recommendations, especially with regard to temperature, rainfall, etc. Spray sod with Round-up or comparable systemic herbicide at least seven days prior to beginning work. If Bermuda grass is present, make at least two such applications in appropriate season prior to stripping sod. Upon beginning work, strip all sod to a depth of at least 2" and remove sod from site unless otherwise directed by the Owner.
 3. Shrub masses may be planted in beds rather than individual holes. Beds shall be evenly tilled to a depth of six inches. Organic matter, fertilizers and herbicides shall be evenly incorporated into those six inches. The soil shall then be raked smooth to an even grade allowing for adequate surface drainage prior to being covered with mulch as indicated on the details. Install weed barrier fabric over soil prior to planting shrubs. Make an "X" cut in the fabric at each plant location and fold back the tabs to allow the shrub to be planted. After planting and before mulch is spread, fold tabs of cut back into place.
 4. All plant beds shall be treated with Ronstar-G or comparable pre-emergent herbicide on the bare soil prior to placing mulch and on top of the mulch after it is in place. Apply per manufacturer's instructions.
- C Root and Ball Preparation: All plant material root balls shall receive the following treatment:
 1. Prior to planting, container grown material shall have containers removed. If root bound, container plants shall have their exterior root mass sliced vertically three times or appropriately loosened in an acceptable manner.
 2. Any non-decomposable twine or containers shall be removed from any plant prior to backfilling. Non-decomposable burlap must be either removed from the root ball after

placement in the hole or rolled under the root ball as far as possible from the surface. Any damaged roots shall be pruned back according to acceptable horticultural practices.

3. The Contractor shall be responsible for the removal and control of any weeds growing in the soil or any container grown or balled and burlapped plants which are used on this project.

3.03 SETTING PLANTS:

- A Backfill in bottom of pit shall be lightly tamped or settled by watering prior to setting plants. Each plant shall be placed in the center of the planting hole in a vertically plumb position. Plants shall be rotated to obtain the best visual appearance and proper relationship to nearby buildings or adjacent plants. Sufficient backfill should be placed in the bottom of the hole so that the plant sits at the same grade or no more than two inches above the grade that it rested in the field. The roots of bare root plants, pruned appropriately, shall be spread out to their approximate natural position over a cone or mound of soil formed in the center of the planting pit. Balled and burlapped plants shall be set straight in the hole while still in their wrapped ball.
- B Backfilling and Backfill Content: Backfill shall consist of topsoil plus peat moss at a ratio of 3:1, respectively. The plant pit shall be backfilled in layers around the roots or ball. Each layer shall be carefully worked around loose roots and lightly settled in place in such a manner as to avoid injury to the roots or ball and to avoid disturbing the position of the plant. When approximately two-thirds of the plant hole has been backfilled: 1) the balled and burlapped plants shall have the top third of the burlap cut away or folded back, 2) All plant pits shall be filled with water and allowed to settle. After water has settled, backfill with specified topsoil mixture and tamp lightly to grade.
- C Watering: Immediately after planting, the entire planting pit area and root mass shall be soaked with contaminant free water again and any erosion caused by watering repaired. All plants shall be watered by the Contractor as required during the maintenance period.
- D Mulching: After the water has been absorbed and any settlement has been brought to grade, a 2-3 inch layer of mulch shall be spread around the base of the plant. As pictured on the planting details, construct a 4 inch saucer of mulch around the plant pit.
- E Pruning: The bruised or broken parts of large or fleshy roots be cut off smooth before planting. The tops of deciduous plants shall be pruned wither immediately before or after planting. This shall consist of removing 1/4 to 1/3 of the top or thinning out and/or heading back the stems and top branches, and shall be done so that the plant retains its natural form. All pruning shall be done in accordance with standard horticultural practices. Only the proper sharp, clean tools shall be used. The top leader of any tree shall never be pruned unless previously approved by the Designer. All cuts shall be made close to the trunk or branch except when heading back. When heading back, cuts shall be made just above a viable bud. Evergreen plants shall not be pruned except to remove dead or broken branches unless otherwise indicated in the drawings. All cut surfaces one inch or more in diameter shall be painted with a standard non-toxic tree wound dressing.
- F Staking: All trees over 6' in height and up to 2" caliper shall be staked in the following manner:
 1. Use 2 parallel stakes driven 18" into firm soil about 1 foot beyond planting hole. The height of the stakes shall be two-thirds that of the tree after being driven into the ground.
 2. The tree is then supported by wires attached to both stakes and looped around trees. Rubber hosing should be used to protect trees.
- G Guying: All trees over a 2" caliper shall be guyed in the following manner:
 1. Stakes are driven into the ground 18" - 30" at a 45 degree angle away from the tree trunk and notched to hold the wire secure. The distance from the tree trunk to the stake is approximately the same as the height of the tree.
 2. The wire is then fastened two-thirds of the way up the trunk by a loose rubber-hose-covered loop. The other end is fastened to the stake.
 3. Tighten wire by twisting wire with a small stick or install turnbuckles if necessary.

H Bed Preparation (Annuals and Groundcovers): The soil for planting beds shall consist of a minimum of 4 inches of topsoil and peat moss in the ratio of 3:1, respectively. Beds shall be evenly tilled, raked to a level grade, and then mulched prior to planting.

1. Plant Preparation: Plants shall be thoroughly soaked with water before planting. Care should be taken to handle plants by their roots. All containerized plants shall have their containers removed and their soil/root mass loosened.
2. Setting Plants: Place plants at even spacing according to the plantings details. Bulbs, tubers, or other below ground root structures shall be placed at a proper depth according to standard horticultural practices.
3. Watering: Immediately after planting, plants shall be thoroughly watered with a diffusing type applicator such as a sprinkler. Water shall be uncontaminated. Contractor shall be responsible for watering until the end of the maintenance period.

3.04 SODDING:

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
1. Lay sod across angle of slopes exceeding 1:3.
 2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
 3. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.05 MAINTENANCE:

- A Begin maintenance immediately after planting.
- B Maintain trees, shrubs, and other plants until after final acceptance but in no case less than the following period: 60 days after substantial completion of planting.
- C Maintain trees, shrubs, and other plants by pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

3.06 CLEAN UP:

- A Clean Up and Restoration of Damaged Areas: During planting, excess and waste materials shall be continuously and promptly removed, lawn areas and paved surfaces kept clear and all reasonable precautions shall be taken to avoid damage to existing structures, plants and grass. Prior to Acceptance of Work, all damaged areas must be restored with the same quality of work as required in these specifications. All debris, waste material, excess soil etc. shall be removed. Walks and paved areas shall be hosed down and scrubbed clean, and the entire site made neat. Contractor shall provide barricades, signage, etc. as is prudently necessary to prevent pedestrian or vehicular accidents which could occur as a result of the Contract work.

End of Section

SECTION 33 10 00 – WATER DISTRIBUTION

1 PART I GENERAL:

1.01 SUMMARY:

- A. This Section includes water-distribution piping and specialties outside the building for the following:
 - 1. Water services.
 - 2. Combined water service and fire-service mains.
 - 3. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.02 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 DEFINITIONS:

- A. Combined Water Service and Fire-Service Main: Exterior water piping for both domestic-water and fire-suppression piping.
- B. Water Service: Exterior domestic-water piping
- C. PVC: Polyvinyl chloride plastic
- D. DIP: Ductile Iron Pipe

1.04 SUBMITTALS:

- A. Product Data: For the following:
 - 1. Piping materials and fittings.
 - 2. Piping specialties.
 - 3. Valves and accessories.
 - 4. Water meters and accessories.
 - 5. Backflow preventers and assemblies.
 - 6. Protective enclosures.
 - 7. Fire hydrants.
 - 8. Flushing hydrants.
 - 9. Post hydrants.
- B. Shop drawings for precast concrete vaults, including frames and covers, ladders, and drains.
- C. Shop drawings for power, signal, and control wiring diagrams.
- D. Coordination Drawings: For piping and specialties including relation to other services in same area. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- E. Field Quality-Control Test Reports.
- F. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section 013300,"Submittals" include the following:
 - 1. Water meters.

2. Valves.
3. Backflow preventers.
4. Protective enclosures.
5. Fire hydrants.
6. Flushing hydrants.
7. Post hydrants.

1.05 QUALITY ASSURANCE:

- A. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of piping and specialties and are based on specific system indicated.
- B. Regulatory Requirements:
 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- F. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- G. Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 1. Ensure that valves are dry and internally protected against rust and corrosion.
 2. Protect valves against damage to threaded ends and flange faces.
 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.07 PROJECT CONDITIONS:

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

- 1. Notify Architect not less than two days in advance of proposed utility interruptions.
- 2. Do not proceed with utility interruptions without Architect's written permission.

1.08 COORDINATION:

- A. Coordinate connection to water main with utility company.

2 PART II PRODUCTS

2.01 MANUFACTURERS:

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
- 2. Products: Subject to compliance with requirements, provide one of the products specified.
- 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
- 4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 DUCTILE-IRON PIPE AND FITTINGS:

- A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.
- B. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.
- C. Gaskets: AWWA C111, rubber.
- D. Ductile-Iron Expansion Joints: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

2.03 COPPER TUBE AND FITTINGS:

- A. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A), water tube, annealed temper.
- B. Copper Fittings: ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings.

- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.04 PVC PIPE AND FITTINGS

- A. PVC, Schedule 40 Pipe: ASTM D 1785. Socket Fittings: ASTM D 2466.
- B. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
 - 1. Comply with UL 1285 for fire-service mains if indicated.
 - 2. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 3. Gaskets: AWWA C111, rubber.
 - 4. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2.05 JOINING MATERIALS:

- A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.
- B. Transition Couplings:
 - 1. Underground Piping, NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
 - 2. Underground Piping, NPS 2 (DN 50) and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
 - 3. Aboveground or Vault Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Brazing Filler Metals: AWS A5.8, BCuP Series.
- D. Soldering Flux: ASTM B 813, water-flushable type.
- E. Solder Filler Metal: ASTM B 32, lead-free type with 0.20 percent maximum lead content.
- F. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.06 JOINING MATERIALS:

- A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.
- B. Transition Couplings:
 - 1. Underground Piping, NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
 - 2. Underground Piping, NPS 2 (DN 50) and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
 - 3. Aboveground or Vault Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

- C. Brazing Filler Metals: AWS A5.8, BCuP Series.
- D. Soldering Flux: ASTM B 813, water-flushable type.
- E. Solder Filler Metal: ASTM B 32, lead-free type with 0.20 percent maximum lead content.
- F. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.07 PIPING SPECIALTIES:

- A. Flexible Connectors:
 - 1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
 - 2. Ferrous Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.
- B. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Tubular-Sleeve Pipe Couplings:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Manufacturing.
 - b. Dresser, Inc.; Dresser Piping Specialties.
 - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - d. Hays Fluid Controls; a division of ROMAC Industries Inc.
 - e. JCM Industries.
 - f. Smith-Blair, Inc.
 - g. Viking Johnson.
 - 2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - a. Standard: AWWA C219.
 - b. Center-Sleeve Material: Manufacturer's standard.
 - c. Gasket Material: Natural or synthetic rubber.
 - d. Pressure Rating: 200 psig (1380 kPa) minimum.
 - e. Metal Component Finish: Corrosion-resistant coating or material.
- D. Split-Sleeve Pipe Couplings:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Victaulic Depend-O-Lok.
 - 2. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
 - a. Standard: AWWA C219.

- b. Sleeve Material: Manufacturer's standard.
- c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
- d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
- e. Pressure Rating: 200 psig (1380 kPa) minimum.
- f. Metal Component Finish: Corrosion-resistant coating or material.

E. Dielectric Fittings:

- 1. Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- 2. Dielectric Unions:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: 250 psig (1725 kPa).
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.
- 3. Dielectric Flanges:
 - a. Standard: ASSE 1079.
 - b. Factory-fabricated, bolted, companion-flange assembly.
 - c. Pressure Rating: 300 psig (2070 kPa).
 - d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- 4. Dielectric-Flange Insulating Kits:
 - a. Nonconducting materials for field assembly of companion flanges.
 - b. Pressure Rating: 150 psig (1035 kPa).
 - c. Gasket: Neoprene or phenolic.
 - d. Bolt Sleeves: Phenolic or polyethylene.
 - e. Washers: Phenolic with steel backing washers.
- 5. Dielectric Nipples:
 - a. Standard: IAPMO PS 66
 - b. Electroplated steel nipple. complying with ASTM F 1545.
 - c. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
 - d. End Connections: Male threaded or grooved.
 - e. Lining: Inert and noncorrosive, propylene.

2.08 CORROSION-PROTECTION ENCASEMENT FOR PIPING:

- A. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

2.09 CAST IRON GATE VALVES:

A. Available Manufacturers:

- 1. American AVK Co.; Valves & Fittings Div.
- 2. American Cast Iron Pipe Co.; American Flow Control Div.
- 3. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
- 4. Crane Co.; Crane Valve Group; Stockham Div.
- 5. East Jordan Iron Works, Inc.
- 6. Grinnell Corporation; Mueller Co.; Water Products Div.
- 7. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
- 8. McWane, Inc.; Kennedy Valve Div.

9. McWane, Inc.; Tyler Pipe; Utilities Div.
 10. NIBCO INC.
 11. United States Pipe and Foundry Company.
- B. Nonrising-Stem, Resilient-Seated Gate Valves: AWWA C509, gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
1. Minimum Working Pressure: 200 psig (1380 kPa).
 2. End Connections: Mechanical joint.
 3. Interior Coating: Complying with AWWA C550.
- C. OS&Y, Rising-Stem, Resilient-Seated Gate Valves: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
1. Standard: AWWA C509.
 2. Minimum Pressure Rating: 200 psig (1380 kPa).
 3. End Connections: Flanged.

2.10 GATE VALVE ACCESSORIES AND SPECIALTIES:

- A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.
1. Available Manufacturers:
 - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - b. East Jordan Iron Works, Inc.
 - c. Grinnell Corporation; Mueller Co.; Water Products Div.
 - d. International Piping Services Company.
 - e. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - f. McWane, Inc.; Kennedy Valve Div.
 - g. McWane, Inc.; M & H Valve Company Div.
 - h. United States Pipe and Foundry Company.
 2. Tapping Sleeve: Ductile-iron two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 3. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5-inch- (125-mm-) diameter barrel.
1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.11 CORPORATION VALVES AND CURB VALVES:

- A. Available Manufacturers:
1. Amcast Industrial Corporation; Lee Brass Co.
 2. Ford Meter Box Company, Inc. (The).
 3. Grinnell Corporation; Mueller Co.; Water Products Div.
 4. Jones, James Company.
 5. Master Meter, Inc.
 6. McDonald, A. Y. Mfg. Co.

7. Red Hed Manufacturing Co.
- B. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
 1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
 2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
 3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

2.12 WATER METERS:

- A. Water meters will be furnished by utility company.
- B. Description: AWWA C700, displacement-type, bronze main case. Register flow in gallons unless cubic feet are indicated.

2.13 WATER-METER BOXES:

- A. Description: Cast-iron body and cover for disc-type water meter with lettering "WATER METER" in cover; and slotted, open-bottom base section of length to fit over service piping.
 1. Option: Base section may be cast-iron, PVC, clay, or other pipe.
- B. Description: For traffic areas - Polymer-concrete body and cover for disc-type water meter with lettering "WATER" in cover; and slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb. minimum over 10 by 10 inches (6800 kg minimum over 254 by 254 mm) square.

2.14 BACKFLOW PREVENTERS:

- A. Reduced-Pressure-Principle Backflow Preventers:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Flomatic Corporation.
 - e. Watts Water Technologies, Inc.
 - f. Wilkins; a Zurn company.
 2. Standard: AWWA C511.
 3. Operation: Continuous-pressure applications.
 4. Pressure Loss: 12 psig (83 kPa) maximum, through middle 1/3 of flow range.
 5. Size: Per utility plan.
 6. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved stainless steel for NPS 2-1/2 (DN 65) and larger.
 7. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.

8. Configuration: Designed for vertical inlet, horizontal center section, and vertical outlet flow.
 9. Accessories: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
- B. Double-Check, Backflow-Prevention Assemblies:
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Flomatic Corporation.
 - e. Watts Water Technologies, Inc.
 - f. Wilkins; a Zurn company.
 2. Standard: AWWA C510.
 3. Operation: Continuous-pressure applications, unless otherwise indicated.
 4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
 5. Size: Per utility plan.
 6. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved stainless steel for NPS 2-1/2 (DN 65) and larger.
 7. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
 8. Configuration: Designed for horizontal, straight through flow.
 9. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
 10. Backflow Preventer Test Kits: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Conbraco Industries, Inc.
 - b. FEBCO; SPX Valves & Controls.
 - c. Flomatic Corporation.
 - d. Watts Water Technologies, Inc.
 - e. Wilkins; a Zurn company.

2.15 CONCRETE VAULTS:

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
- B. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
- C. Manhole: ASTM A 48, Class No.35 (ASTM A48M, Class No.250) minimum tensile strength, gray-iron traffic frame and cover, 24-inch (610-mm) diameter or greater, unless otherwise indicated.

- D. Drain: ASME A112.21.1M, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed clapper-type backwater valve.

2.16 PROTECTIVE ENCLOSURES:

A. Available Manufacturers:

1. G&C Enclosures, Inc.
2. Hot Box, Inc.
3. HydroCowl, Inc.
4. Watts Industries, Inc.; Water Products Div.

B. Freeze-Protection Enclosures: Insulated and with heat source to maintain minimum internal temperature of 40° F (4° C) when external temperatures reach as low as -34° F (-36° C).

1. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
2. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
 - a. Housing: Reinforced -fiberglass construction.
 - i. Drain opening for units with drain connection.
 - ii. Access doors with locking devices.
 - iii. Insulation inside housing.
 - iv. Anchoring devices for attaching housing to concrete base.
3. Electric heating cable or heater with self-limiting temperature control.

C. Precast concrete base of dimensions required to extend at least 6 inches (150 mm) beyond edges of enclosure housings. Include openings for piping.

2.17 FREESTANDING FIRE HYDRANTS:

A. Dry-Barrel, High-Pressure Fire Hydrants: AWWA C502, one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 5-1/4 inch (133 mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure, and 250-psig (1725-kPa) minimum working-pressure design.

1. Available Manufacturers:

- a. American AVK Co.; Valves & Fittings Div.
- b. American Cast Iron Pipe Co.; American Flow Control Div.
- c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
- d. American Foundry Group, Inc.
- e. East Jordan Iron Works, Inc.
- f. Grinnell Corporation; Mueller Co.; Water Products Div.
- g. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
- h. McWane, Inc.; Kennedy Valve Div.
- i. McWane, Inc.; M & H Valve Company Div.
- j. Troy Valve.
- k. United States Pipe and Foundry Company.

2. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.

3. Operating and Cap Nuts: Pentagon, 1-1/2 inches (40 mm) point to flat.
4. Operation: Open hydrant valve by turning operating nut to left or counterclockwise.
5. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated. Verify color requirements with jurisdiction having authority.

2.18 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Elkhart Brass Mfg. Co., Inc.
 - b. Fire End & Croker Corporation.
 - c. Guardian Fire Equipment, Inc.
 - d. Kidde Fire Fighting.
 - e. Potter Roemer.
 - f. Reliable Automatic Sprinkler Co., Inc.
2. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- (460-mm-) high brass sleeve; and round escutcheon plate.
 - a. Standard: UL 405.
 - b. Connections: Two NPS 2-1/2 (DN 65) inlets and one NPS 4 (DN 100) outlet.
 - c. Inlet Alignment: Inline, horizontal.
 - d. Finish Including Sleeve: Polished bronze.
 - e. Escutcheon Plate Marking: "AUTO SPKR."

2.19 ALARM DEVICES

- A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.
- B. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

3 PART III EXECUTION

3.01 EARTHWORK:

- A. Refer to Division 31 Section for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS:

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- C. Do not use flanges, unions, or keyed couplings for underground piping.

- D. Flanges, unions, keyed couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground Water-Service Piping NPS ¾ to NPS 3. Use the following piping materials for each size range unless otherwise indicated on the drawings:
 - 1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); wrought-copper, solder-joint fittings; and brazed joints; or
 - 2. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
- F. Underground water-service piping NPS 4 to NPS 8. Use the following piping materials for each size range unless otherwise indicated on the drawings:
 - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints; or
 - 2. PVC, AWWA Class 200 pipe; mechanical-joint, ductile-iron fittings; and gasketed joints.
- G. Water Meter Box Water-Service Piping NPS ¾ to NPS 3 shall be same as underground water-service piping.
- H. Underground Fire-Service-Main Piping NPS 4 to NPS 12. Use the following piping materials for each size range unless otherwise indicated on the drawings:
 - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints; or
 - 2. PVC, AWWA Class 200 pipe listed for fire-protection service; mechanical-joint, ductile-iron fittings; and gasketed joints.
- I. Underground Combined Water-Service and Fire-Service-Main Piping NPS 6 to NPS 12. Use the following piping materials for each size range unless otherwise indicated on the drawings:
 - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.
 - 2. PVC, AWWA Class 200 pipe listed for fire-protection service; mechanical-joint, ductile-iron fittings; and gasketed joints.

3.03 VALVE APPLICATIONS:

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use flanged-end valves for installation in vaults. Use UL/FM, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, nonrising-stem, resilient seated gate valves with valve box.

3.04 JOINT CONSTRUCTION:

- A. Make pipe joints according to the following:
 - 1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.

2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. Copper Tubing Soldered Joints: ASTM B 828. Use flushable flux and lead-free solder.
4. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
5. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.05 PIPING INSTALLATION:

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:
 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:
 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
 2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
 4. Install corporation valves into service-saddle assemblies.
 5. Install manifold for multiple taps in water main.
 6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Comply with NFPA 24 for fire-service-main piping materials and installation.
 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- G. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- H. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.
- I. Unless otherwise indicated on drawings, bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
 1. Under Driveways and Roads: With at least 36 inches cover over top.
 2. Under Railroad Tracks: With at least 48 inches cover over top.
 3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.
 4. Under Roads: With at least 36 inches cover over top.

- J. Install piping by tunneling, jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- K. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.
- L. Sleeves and mechanical sleeve seals are specified elsewhere.
- M. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- N. Anchor service-entry piping to building wall.
- O. See Division 22 sections for potable-water piping inside the building.
- P. See Division 21 sections for fire-suppression water piping inside the building.
- Q. Install water-supply piping with shutoff valve in water supply to each and any post hydrant and drinking fountain indicated. Use curb valve and service box.
- R. Install trap below frost line on drain outlet of each and any drinking fountain indicated.

3.06 ANCHORAGE INSTALLATION:

- A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
- B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.07 VALVE INSTALLATION:

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.08 WATER-METER INSTALLATION:

- A. Install water meters, piping, and specialties according to utility company's written requirements.
- B. Water Meters: Install displacement-type water meters, NPS 2 (DN 50) and smaller, in meter boxes with shutoff valves on water-meter inlets. Include valves on water-meter outlets and valved bypass around meters unless prohibited by authorities having jurisdiction.

3.09 ROUGHING-IN FOR WATER METERS:

- A. Rough-in piping and specialties for water-meter installation according to utility company's written instructions and requirements.

3.10 BACKFLOW-PREVENTER INSTALLATION:

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers with relief drain in vault or other space subject to flooding.
- C. Do not install bypass piping around backflow preventers.
- D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.11 Vault Construction /Installation:

- A. See Section 03 30 00 "Concrete Work" for concrete vaults.
- B. Install precast concrete vaults according to ASTM C 891.
- C. Connect drain outlet to storm drainage piping. Refer to Division 33 41 00 for Storm Drainage

3.12 Protective Enclosure Installation:

- A. Install concrete base level and with top approximately 2 inches (50 mm) above grade.
- B. Install protective enclosure over valves and equipment.
- C. Anchor protective enclosure to concrete base.

3.13 Fire Hydrant Installation:

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. AWWA-Type Fire Hydrants: Comply with AWWA M17.

3.14 Post Hydrant Installation:

- A. Install post hydrants in pavement or with concrete anchor.

3.15 Fire Department Connection Installation

- A. Install ball drip valves at each check valve for fire department connection to mains.
- B. Install protective pipe bollards on two sides of each fire department connection. Pipe bollards are specified in Division 05 Section "Metal Fabrications."

3.16 Alarm Device Installation

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 - 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:

1. Valves: Install chain and padlock on open OS&Y gate valve.
 2. Post Indicators: Install padlock on wrench on indicator post.
- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Division 28 Section "Fire Detection and Alarm."
- 3.17 CONNECTIONS:
- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.
- B. See Plumbing Sections for piping connections to valves and equipment.
- C. Connect water-distribution piping to utility water main. Use tapping sleeve and tapping valve or to local utility specifications.
- D. Connect water-distribution piping to interior domestic-water and fire-suppression piping.
- E. Connect waste piping from drinking fountains to sanitary sewerage system. See Section 33 00 "Sanitary Sewerage" for connection to sanitary-sewer piping.
- F. Ground equipment according to Division 26 requirements for Grounding.
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- 3.18 FIELD QUALITY CONTROL:
- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.
1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.
- 3.19 IDENTIFICATION:
- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Earthwork Section for underground warning tapes.
- B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Plumbing Specifications for additional identification requirements.
- 3.20 CLEANING:
- A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.
- C. After completing drinking fountain installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Clean drinking fountains, on completion of installation, according to manufacturer's written instructions.

End of Section

SECTION 33 30 00 – SANITARY SEWERAGE

1 PART I GENERAL

1.01 SUMMARY:

- A. This Section includes sanitary sewerage outside the building.

1.02 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

Division 22 Plumbing
Section 03 30 00 Concrete Work

1.03 DEFINITIONS:

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene-monomer rubber.
- C. PE: Polyethylene plastic.
- D. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS:

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.
- B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

1.05 SUBMITTALS:

- A. Product Data: For the following:
 - 1. Stainless-steel drainage systems.
 - 2. Backwater valves and cleanouts.
 - 3. Manhole cover inserts.
- B. Shop Drawings: Include plans, elevations, details, and attachments for the following:
 - 1. Precast concrete manholes, including frames and covers.
 - 2. Cast-in-place concrete manholes and other structures, including frames and covers.
- C. Coordination Drawings: Show manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.
- D. Coordination Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate underground structures and pipe. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- E. Design Mix Reports and Calculations: For each class of cast-in-place concrete.

- F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Do not store plastic structures, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.07 PROJECT CONDITIONS:

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

2 PART II PRODUCTS

2.01 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Stainless-Steel Drainage Systems:
 - a. Josam Co.; Blucher-Josam Div.
 - 2. Gray-Iron Backwater Valves and Cleanouts:
 - a. Josam Co.
 - b. McWane, Inc.; Tyler Pipe; Wade Div.
 - c. Smith: Jay R. Smith Mfg. Co.
 - d. Watts Industries, Inc.; Ancon Drain Div.
 - e. Watts Industries, Inc.; Enpoco, Inc. Div.
 - f. Zurn Industries, Inc.; Hydromechanics Div.
 - 3. PVC Backwater Valves and Cleanouts:
 - a. Canplas, Inc.
 - b. IPS Corp.
 - c. NDS, Inc.
 - d. Plastic Oddities, Inc.
 - e. Sioux Chief Manufacturing Co., Inc.
 - 4. Manhole Cover Inserts:

- a. FRW Industries, Inc.
- b. Knutson Manufacturing Co.
- c. Parson Environmental Products, Inc.

2.02 PIPING MATERIALS:

- A. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints.
 - 1. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
 - 2. Gaskets: AWWA C111, rubber.
- B. PVC Sewer Pipe and Fittings: According to the following:
 - 1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints.
 - a. Gaskets: ASTM F 477, elastomeric seals.

2.03 SPECIAL PIPE COUPLINGS AND FITTINGS:

- A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.
 - 1. Sleeve Material for Concrete Pipe: ASTM C 443, rubber.
 - 2. Sleeve Material for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 - 3. Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
 - 4. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
 - 5. Bands: Stainless steel, at least one at each pipe insert.
- B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.
 - 1. Material for Concrete Pipe: ASTM C 443, rubber.
 - 2. Material for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 - 3. Material for Plastic Pipe: ASTM F 477, elastomeric seal.
 - 4. Material for Dissimilar Pipe: Compatible with pipe materials being joined.
- C. Pressure-Type Pipe Couplings: AWWA C219, iron-body sleeve assembly matching OD of pipes to be joined, with AWWA C111 rubber gaskets, bolts, and nuts. Include PE film, pipe encasement.
- D. Ductile-Iron Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for 250 psig minimum working pressure and for expansion indicated. Include PE film, pipe encasement.

2.04 PE FILM, PIPE ENCASEMENT:

- A. ASTM A 674 or AWWA C105; PE film, tube, or sheet; 8 mil thickness.

2.05 MANHOLES:

- A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
 - 1. Diameter: 48 inches minimum, unless otherwise indicated.
 - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

3. Base Section: 6 inch minimum thickness for floor slab and 4 inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
 4. Riser Sections: 4 inch minimum thickness, and lengths to provide depth indicated.
 5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 6. Gaskets: ASTM C 443 , rubber.
 7. Grade Rings: Include two or three reinforced-concrete rings, of 6 to 9 inch total thickness, that match 24 inch diameter frame and cover.
 8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12 to 16 inch intervals. Omit steps for manholes less than 60 inches deep.
 9. Steps: ASTM C 478 (ASTM C 478M), individual steps or ladder. Omit steps for manholes less than 60 inches (1500 mm) deep.
 10. Pipe Connectors: ASTM C 923 , resilient, of size required, for each pipe connecting to base section.
- B. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
1. Ballast: Increase thickness of concrete, as required to prevent flotation.
 2. Grade Rings: Include two or three reinforced-concrete rings, of 6 to 9 inch (150 to 229 mm) total thickness, that match 24 inch (610 mm) diameter frame and cover.
 3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12 to 16 inch intervals. Omit steps for manholes less than 60 inches deep.
 4. Steps: Manufactured from deformed, 1/2 inch (13 mm) steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12 to 16 inch (300 to 400 mm) intervals. Omit steps for manholes less than 60 inches (1,500 mm) deep.
- C. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24 inch ID by 7 to 9 inch riser with 4 inch minimum width flange, and 26 inch diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.
- D. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.
1. Type: Solid.
 2. Type: With drainage and vent holes.
 3. Type: With valve.

2.06 CONCRETE:

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.

- B. Portland Cement Design Mix: 4,000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 , deformed steel.
- C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4,000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
 - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 2 percent through manhole.
 - 2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3,000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.07 PROTECTIVE COATINGS:

- A. Description: One- or two-coat, coal-tar epoxy; 15 mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:
 - 1. Concrete Manholes: On interior surface.
 - 2. Manhole Frames and Covers: On surfaces that will be exposed to sewer gases.

2.08 CLEANOUTS:

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside caulk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
 - 1. Light Duty: In earth or grass foot-traffic areas.
 - 2. Medium Duty: In paved foot-traffic areas.
 - 3. Heavy Duty: In vehicle-traffic service areas.
 - 4. Extra-Heavy Duty: In roads.
 - 5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

3 PART III EXECUTION

3.01 EARTHWORK:

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthwork."

3.02 IDENTIFICATION:

- A. Materials and their installation are specified in Division 31 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.03 PIPING APPLICATIONS:

- A. General: Include watertight joints.

- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

- C. Gravity-Flow Piping: Use the following:

1. NPS 3: Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints, unless otherwise indicated on the drawings.
2. NPS 4 and NPS 6: Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints, unless otherwise indicated on the drawings.
3. NPS 4 and NPS 6: ABS, SDR 35, sewer pipe and fittings; gaskets and gasketed joints, only where indicated on the drawings.
4. NPS 8 and NPS 10: Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints, unless otherwise indicated on the drawings.
5. NPS 8 and NPS 10 (DN200 and DN250): PVC sewer pipe and fittings, gaskets and gasketed joints, only where indicated on the drawings.
6. NPS 12 to NPS 16 (DN300 to DN400): Ductile-iron sewer pipe, standard-pattern, ductile-iron fittings, gaskets; and gasketed joints, unless otherwise indicated on the drawings.
7. NPS 12 and NPS 15: PVC sewer pipe and fittings, gaskets and gasketed joints, only where indicated on the drawings.
8. Pipe Sizes NPS 18 to NPS 24 (DN450 to DN600): Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints.

3.04 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS:

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

1. Use the following pipe couplings for nonpressure applications:
 - a. Sleeve type to join piping, of same size, or with small difference in OD.
 - b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
 - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
2. Use pressure-type pipe couplings for force-main joints. Include PE film, pipe encasement.

- B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.

3.05 INSTALLATION, GENERAL:

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 - 2. Install piping with 36 inch minimum cover, unless otherwise indicated on the drawings.
- F. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

3.06 PIPE JOINT CONSTRUCTION AND INSTALLATION:

- A. General: Join and install pipe and fittings according to installations indicated.
- B. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.
- C. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
 - 1. Install PE film, pipe encasement over ductile-iron sewer pipe and ductile-iron fittings according to ASTM A 674 or AWWA C105.
- D. PVC Sewer Pipe and Fittings: As follows:
 - 1. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
 - 2. Join profile sewer pipe fittings with gaskets according to ASTM D 2321 and manufacturer's written instructions.
 - 3. Install according to ASTM D 2321.
- E. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.
- F. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.
- G. Install with top surfaces of components, except piping, flush with finished surface.

3.07 MANHOLE INSTALLATION:

- A. General: Install manholes, complete with appurtenances and accessories indicated.

- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
- D. Install precast concrete manhole sections with gaskets according to ASTM C 891.
- E. Construct cast-in-place manholes as indicated.

3.08 CONCRETE PLACEMENT:

- A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.09 CLEANOUT INSTALLATION:

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 x 18 x 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.10 TAP CONNECTIONS:

- A. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.
- B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6 inch overlap, with not less than 6 inches of concrete with 28 day compressive strength of 3,000 psi .
- C. Make branch connections from side into existing piping, NPS 4 to NPS 20 . Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28 day compressive strength of 3,000 psi .
- D. Make branch connections from side into existing piping, NPS 21 or larger, or to underground structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - 1. Use concrete that will attain minimum 28 day compressive strength of 3,000 psi, unless otherwise indicated.
 - 2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.11 CLOSING ABANDONED SANITARY SEWERAGE SYSTEMS:

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8 inch- thick, brick masonry bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Structures: Excavate around structure as required and use one procedure below:
1. Remove structure and close open ends of remaining piping.
 2. Remove top of structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
 3. Backfill to grade according to Division 2 Section "Earthwork."
- 3.12 FIELD QUALITY CONTROL:
- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
1. Place plug in end of incomplete piping at end of day and when work stops.
 2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate reports for each test.
 5. If authorities having jurisdiction do not have published procedures, perform tests as follows:
 - a. Sanitary Sewerage: Perform hydrostatic test.
 - i. Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24 hour period.

- ii. Close openings in system and fill with water.
 - iii. Purge air and refill with water.
 - iv. Disconnect water supply.
 - v. Test and inspect joints for leaks.
 - vi. Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig .
- b. Sanitary Sewerage: Perform air test according to UNI-B-6.
- c. Option: Test concrete piping according to ASTM C 924 .
- d. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than one and one-half times maximum system operating pressure, but not less than 150 psig (1,035 kPa).
 - i. Ductile-Iron Piping: Test according to AWWA C600, Section "Hydraulic Testing."
 - ii. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
- 6. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).
- 7. Leaks and loss in test pressure constitute defects that must be repaired.
- 8. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

End of Section

SECTION 33 41 00 – STORMWATER COLLECTION SYSTEM

PART I GENERAL

1.01 SCOPE:

- A. Extent of storm sewer collection system work is shown on drawings. Storm Sewer collection system work includes, but is not limited to, the following:
 - 1. Pipe and fittings.
 - 2. Non-pressure transition couplings.
 - 3. Cleanouts.
 - 4. Drains.
 - 5. Manholes.
 - 6. Channel drainage systems.
 - 7. Catch basins.
 - 8. Stormwater inlets.
 - 9. Pipe outlets.

1.02 RELATED DOCUMENTS:

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

1.03 QUALITY ASSURANCE:

- A. Installer: A firm specializing and experienced in sewer collection system work for not less than two (2) years.
- B. Comply with the requirements of applicable Division 2 sections for excavation and backfilling required in connection with exterior water service piping.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Manholes: Include plans, elevations, sections, details, frames, and covers.
 - 2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.06 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Architect's written permission.

PART II PRODUCTS

2.01 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.

2.02 STEEL PIPE AND FITTINGS

- A. Corrugated-Steel Pipe and Fittings: ASTM A 760/A 760M, Type I with fittings of similar form and construction as pipe.
 1. Standard-Joint Bands: Corrugated steel.
 2. Coating: Zinc.

2.03 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 2. Fittings: ASTM D 3034, PVC with bell ends.
 3. Gaskets: ASTM F 477, elastomeric seals.

2.04 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.
 1. Tongue-and-groove ends and gasketed joints with ASTM C 443
 2. Class III.

2.05 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 1. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco Inc.
 - c. Logan Clay Pipe.
 - d. Mission Rubber Company; a division of MCP Industries, Inc.
 2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Mfg.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company; a division of MCP Industries, Inc.
2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fernco Inc.
 - b. Logan Clay Pipe.
 - c. Mission Rubber Company; a division of MCP Industries, Inc.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.06 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Top-Loading Classification: Heavy Duty.
4. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.07 DRAINS

A. Cast-Iron Area Drains:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Josam Company.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
2. Description: ASME A112.6.3 gray-iron round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
 3. Top-Loading Classification(s): Heavy Duty.

B. Cast-Iron Trench Drains:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
2. Description: ASME A112.6.3, 6-inch wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular grate. Include units of total length indicated and quantity of bottom outlets with inside calk or spigot connections, of sizes indicated.
3. Top-Loading Classification(s): Heavy Duty.

2.08 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
9. Grade Rings: Reinforced-concrete rings, 6-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile or ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.09 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

- A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. ABT, Inc.
 2. ACO USA.
 3. Innovative Plastic, Inc.; a subsidiary of T-H Marine Supplies, Inc.
 4. Mea-Josam Div.; Josam Company.
 5. Poly-Cast.
- C. Sloped-Invert, Polymer-Concrete Systems:
 1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 4-inch inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.
 - c. Extension sections necessary for required depth.
 - d. Frame: Include gray-iron or steel frame for grate.
 2. Grates:
 - a. Manufacturer's designation "ADA Heavy Duty," with slots or perforations that fit recesses in channels.
 - b. Material: Stainless steel.
 3. Covers: Solid gray iron if indicated.
 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- D. Drainage Specialties: Precast, polymer-concrete units.
 1. Large Catch Basins:
 - a. 24-by-12-inch polymer-concrete body, with outlets in quantities and sizes indicated.
 - b. Gray-iron slotted grate.
 - c. Frame: Include gray-iron or steel frame for grate.
 2. Small Catch Basins:
 - a. 19- to 24-inch by approximately 6-inch polymer-concrete body, with outlets in quantities and sizes indicated.
 - b. Gray-iron slotted grate.

- c. Frame: Include gray-iron or steel frame for grate.
- 3. Sediment Interceptors:
 - a. 27-inch square, polymer-concrete body, with outlets in quantities and sizes indicated.
 - b. 24-inch square, gray-iron frame and slotted grate.
- E. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
- F. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

2.10 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
 - 1. Description: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
 - 3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
 - 4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 - 5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
 - 6. Grade Rings: Include two or three reinforced-concrete rings, of 6-inch total thickness, that match 24-inch diameter frame and grate.
 - 7. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
 - 8. Pipe Connectors: ASTM C 923 resilient, of size required, for each pipe connecting to base section.

2.11 STORMWATER INLETS

- A. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to City standards. Include heavy-duty frames and grates.
- B. Frames and Grates: Heavy duty, according to City standards.

2.12 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
 - 1. Average Size: NSSGA No. R-5, screen opening 5 inches.
- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.
- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

PART III EXECUTION

3.01 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.02 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, non-pressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install piping with 24-inch minimum cover.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 5. Install corrugated steel piping according to ASTM A 798/A 798M.
 - 6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 7. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
 - 1. Hub-and-spigot, cast-iron soil pipe and fittings.

3.03 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure drainage piping according to the following:
 - 1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 - 2. Join corrugated steel sewer piping according to ASTM A 798/A 798M.
 - 3. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
 - 4. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 - 5. Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.04 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron, or PVC, soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in asphalt or Portland cement concrete paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.05 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
 - 1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
- B. Embed drains in 4-inch minimum concrete around bottom and sides.
- C. Fasten grates to drains if indicated.
- D. Set drain frames and covers with tops flush with pavement surface.
- E. Assemble trench sections with flanged joints.
- F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.06 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.07 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.08 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

- E. Construct energy dissipaters at outlets, as indicated.

3.09 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.10 CHANNEL DRAINAGE SYSTEM INSTALLATION

- A. Install with top surfaces of components, except piping, flush with finished surface.
- B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
- C. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
- D. Fasten grates to channel sections if indicated.
- E. Assemble channel sections with flanged or interlocking joints.
- F. Embed channel sections in 4-inch minimum concrete around bottom and sides.

3.11 CONNECTIONS

- A. Connect non-pressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Facility Storm Drainage Piping."
- B. Connect force-main piping to building's storm drainage force mains specified in Division 22 Section "Facility Storm Drainage Piping." Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

- D. Connect to sediment interceptors specified in Division 22 Section "Sanitary Waste Interceptors."
- E. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use non-pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping unless otherwise indicated.
 - a. Shielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.12 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
 - 1. Remove manhole or structure and close open ends of remaining piping.
 - 2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Division 31 Section "Earth Moving."

3.13 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.14 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

End of Section