



Ozarka College
New Tech. Building
Melbourne, Arkansas
72556

Pre-Bid Meeting:

Bid Date & Time:

- The Owner reserves the right to accept and/or reject any or all bids, to waive any irregularity and/or stated procedure in the bids, the bidding process or awarding of a contract, and to accept the bid(s) which are in their best interest.
- The Contractor's submission of a bid/proposal to the Construction Manager means that all work shown in the Drawings and stated in this Project manual that pertains to their trade and/or specialty is a part of their bid / proposal.

Architecture Plus, Inc.

907 South 21st Street
Fort Smith, Arkansas 72901
Tel: (479) 783-8395; Fax: (479) 783-0935
Email: michael@archplusinc.net
ARCHITECTS



PROJECT NO.: 24-55

February 21, 2025

SET NO.:

OZARKA COLLEGE
Melbourne, Arkansas

NEW TECHNICAL BUILDING
Aplus Project No.: 24-55

PROJECT DIRECTORY

Owner: Ozarka College
218 College Drive
Melbourne, Arkansas 72556
Contact: Marcus Orf
Tel: (870) 368-2060
Email: marcus.orf@ozarka.edu

Architect: Architecture Plus, Inc.
907 South 21st Street
Fort Smith, Arkansas 72901
Tel. (479) 783-8395; Fax (479) 783-0935
Project Architect: Michael G. Johnson, AIA, LEED AP
Email: michael@archplusinc.net



Mechanical/Electrical/
Plumbing Engineer: Engineering Elements, PLLC
2458 East Joyce Blvd. Suite 1
Fayetteville, AR 72703
Telephone: (479) 695-1333; FAX: (479) 251-7982
Project Engineer: Shane Lanning, PE
Email: slanning@eemep.com

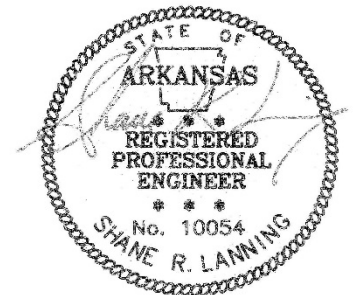


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BIDDING REQUIREMENTS – AS ISSUED BY THE CONSTRUCTION MANAGER

Documents May Include:

- Invitation to Bid
- Instructions to Bidders
- Proposal (Bid Form)
- Bid Bond – AIA Document A310
- Performance Bond – AIA Document A312
- Labor and Material Payment Bond – AIA Document A312

GENERAL CONDITIONS – AS ISSUED BY THE CONSTRUCTION MANAGER

Documents May Include:

- General Conditions - AIA Document A201-2017
- Supplementary Conditions
- Special Conditions
- Sample Certificate of Required Insurance

PROCUREMENT REQUIREMENTS

SECTION 003100 - Information Available to Bidders

SECTION 006000 - Project Forms

AND OTHER DOCUMENTS AS ISSUED BY THE CONSTRUCTION MANAGER

DIVISION 1 - GENERAL REQUIREMENTS

EACH SEPARATE CONTRACTOR (SUBCONTRACTOR / TRADE SUPPLIER) IS REQUIRED TO ADHERE TO EACH SECTION OF DIVISION 01 (BELOW) AND COORDINATE SUCH WITH THE CONSTRUCTION MANAGER. INFORMATION FROM THE CONSTRUCTION MANAGER TAKES PRECEDENCE OVER INFORMATION WITHIN THE SECTIONS OF DIVISION 01.

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- SECTION 010150 - Contractor's Use of the Premises
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- SECTION 011520 - Applications for Payment
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SECTION 015719 - Environment Protection

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DIVISION 4 - MASONRY

None, or as may be noted on the Drawings.

DIVISION 5 - METALS

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SECTION 062000- Finish Carpentry

DIVISION 7 - MOISTURE PROTECTION

SECTION 070160 – Flashing and Sheet Metal
SECTION 072100- Building Insulation
SECTION 072700- Firestopping
SECTION 077200- Roof Accessories
SECTION 079200- Sealants and Caulking

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SECTION 083600 – Sectional Overhead Doors – Insulated Steel
SECTION 087100- Door Hardware
SECTION 088000- Glazing

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SECTION 092600- Gypsum Wallboard System and Non-Load Bearing Metal Studs
SECTION 095100- Acoustical Ceiling
SECTION 096500- Resilient Flooring
SECTION 097720 – Fiberglass Reinforced Wall Panels
SECTION 099000- Paint

DIVISION 10 - SPECIALTIES

SECTION 105300 – Protective Covers (Aluminum Canopies)
SECTION 109000- Miscellaneous Specialties: FEC, Signs, Corner Guards, Etc.

DIVISION 11 – EQUIPMENT

Not Required

DIVISION 12 - FURNISHINGS

Not Required

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 133419- Pre-Engineered Metal Building
SECTION 138510- Fire Alarm System

DIVISION 14 - CONVEYING SYSTEMS

None Required

DIVISION 21 – FIRE SUPPRESSION

None Required

DIVISION 22 – PLUMBING

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SECTION 329120 – Landscape Work (Top Soil and Sod)

DIVISION 33 – UTILITIES

None Required, or as may be shown on the Drawings.

APPENDIX

A – Abbreviations

SECTION 003100 – INFORMATION AVAILABLE TO BIDDERS

PART 1 - EXISTING DRAWINGS

1.1 EXISTING DRAWINGS

- A. **Contractors must investigate all existing conditions prior to submitting a cost to the Construction Manager.**

1.2 SUBSURFACE REPORTS AND SURVEYS

- A. A geotechnical report with respect to the building site was not prepared for this Project. **The building at site structural design were based upon the Drawings for the existing building. Contractors can request an electronic copy (PDF) of these Drawings by contacting Michael G. Johnson, AIA at michael@archplusinc.net. These Drawings can be requested during the Bidding and/or Construction process.**

1.3 TOPOGRAPHIC SURVEY

- A. A copy of the topographic survey with respect to the project site was not prepared. **The building at site structural design were based upon the Drawings for the existing building. Contractors can request an electronic copy (PDF) of these Drawings by contacting Michael G. Johnson, AIA at michael@archplusinc.net. These Drawings can be requested during the Bidding and/or Construction process.**
- B. The existing building survey identifies grade elevations prepared primarily for the use by Architecture Plus in establishing new grades and identifying natural water shed (storm water).

1.4 GRADING PLAN

- A. A copy of the Grading and Drainage Plan and/or Site Grading Plan (Architectural Site Plan) is included in the Drawings for the project's location.

END OF SECTION

SECTION 006000 – PROJECT FORMS

PART 1 - PROJECT FORMS TO BE USED BY EACH CONTRACTOR

1.1 PROJECT FORMS INCLUDED

- A. Submittal Transmittal Form
- B. AIA Document G702 – 1992 Application and Certificate for Payment
- C. AIA Document G703 – 1992 Continuation Sheet
- D. AIA Document G701 – 2017 Change Order
- E. AIA Document G704 – 2017 Certificate of Substantial Completion
- F. AIA Document G706 – 1994 Contractor's Affidavit of Payment of Debts and Claims
- G. AIA Document G706A – 1994 Contractor's Affidavit of Release of Liens
- H. AIA Document G707 – 1994 Consent of Surety to Final Payment

1.2 PROJECT FORMS BY CONSTRUCTION MANAGER

- A. The Construction Manager (CM) may also require specific forms or processes to be used / followed which may change those stated above. Such shall be issued by the CM during the bidding and / or construction process.**

END OF SECTION

Transmittal Letter

Architecture Plus, Inc.

907 South 21st Street
Fort Smith, Arkansas 72901
(479) 783-8395; Fax: (479) 783-0935
Architects • Interior Designers

PROJECT:

TO:

Architecture Plus, Inc.
Project No.:
Date:

We are sending you:

- ☐ Attached ☐ Under separate cover via _____ ☐ Per your request _____

Via:

- ☐ Hand Delivery ☐ USPS ☐ Other _____

The Following:

- | | | |
|---|---|---|
| <input type="checkbox"/> Drawings | <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Samples |
| <input type="checkbox"/> Specifications | <input type="checkbox"/> Shop Drawing Reproducibles | <input type="checkbox"/> Product Literature |
| <input type="checkbox"/> Change Order | <input type="checkbox"/> Proposal Request Certificate | <input type="checkbox"/> Submittals |

For Your:

- | | | |
|---|--|--|
| <input type="checkbox"/> approval | <input type="checkbox"/> distribution to parties | <input type="checkbox"/> information |
| <input type="checkbox"/> review & comment | <input type="checkbox"/> record | <input type="checkbox"/> review and/or signature |
| <input type="checkbox"/> use | <input type="checkbox"/> | |

Copies	Date	Rev. No.	Description	Action Code

Action Code:	A. Action indicated on item transmitted	D. For signature and forwarding as noted below under REMARKS
	B. No action required	E. For review
	C. For signature and return to this office	F. See REMARKS below

Copies to: Architecture Plus, Inc./File	(with enclosures) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Sent By:
---	---	-----------------



AIA® Document G702® - 1992

Application and Certificate for Payment

TO OWNER: Ozarka College
218 College Drive
Melbourne, AR 72256

PROJECT: Ozarka College New Technical Building
Melbourne, AR 72556

APPLICATION NO: 001

Distribution to:
OWNER: []
ARCHITECT: []
CONTRACTOR: []
FIELD: []
OTHER: []

FROM CONTRACTOR: VIA Architecture Plus, Inc.
ARCHITECT: 907 South 21st Street

PERIOD TO: February 21, 2025
CONTRACT FOR:
CONTRACT DATE: 02-21-2025
PROJECT NOS: 24-55 / /

CONTRACTOR'S APPLICATION FOR PAYMENT
Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703, Continuation Sheet, is attached.

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

1. ORIGINAL CONTRACT SUM..... 0.00

2. NET CHANGE BY CHANGE ORDERS..... 0.00 CONTRACTOR:

3. CONTRACT SUM TO DATE (Line 1 + 2)..... 0.00 By: Date:

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)..... 0.00 State of: County of:

5. RETAINAGE:
a. 0.00% of Completed Work (Column D + E on G703) = 0.00 Subscribed and sworn to before me this day of
b. 0.00% of Stored Material (Column F on G703) = 0.00 Notary Public:
Total Retainage (Lines 5a + 5b or Total in Column I of G703)..... 0.00 My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT
In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

6. TOTAL EARNED LESS RETAINAGE..... 0.00 AMOUNT CERTIFIED..... 0.00
(Line 4 Less Line 5 Total) (Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT..... 0.00 ARCHITECT:

8. CURRENT PAYMENT DUE..... 0.00

9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6) 0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	0.00	0.00
Total approved this Month	0.00	0.00
TOTALS	0.00	0.00
NET CHANGES by Change Order		0.00

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.



AIA Document G702 [®] , Application and Certification for Payment, or G732 [™] , Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached. Use Column I on Contracts where variable retainage for line items may apply.	Ozarka College New Technical Building Melbourne, AR 72556	001
		02-21-2025
		February 21, 2025
		24-55

[illegible]



AIA® Document G701® – 2017

Change Order

PROJECT: *(Name and address)*
Ozarka College New Technical Building
Melbourne, AR 72556

CONTRACT INFORMATION:
Contract For:
Date: 02-21-2025

CHANGE ORDER INFORMATION:
Change Order Number: 001
Date:

OWNER: *(Name and address)*
Ozarka College
218 College Drive
Melbourne, AR 72256

ARCHITECT: *(Name and address)*
Architecture Plus, Inc.
907 South 21st Street

CONTRACTOR: *(Name and address)*

THE CONTRACT IS CHANGED AS FOLLOWS:

(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)

The original Contract Sum was	\$	0.00
The net change by previously authorized Change Orders	\$	0.00
The Contract Sum prior to this Change Order was	\$	0.00
The Contract Sum will be unchanged by this Change Order in the amount of	\$	0.00
The new Contract Sum including this Change Order will be	\$	0.00

The Contract Time will be unchanged by () days.
The new date of Substantial Completion will be

NOTE: This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

ARCHITECT *(Signature)*

BY: Michael G. Johnson, AIA,
Secretary/Treasurer, Architecture Plus,
Inc.

*(Printed name, title, and license
number if required)*

Date

CONTRACTOR *(Signature)*

BY: Contractor
(Printed name and title)

Date

OWNER *(Signature)*

BY: Ozarka College
(Printed name and title)

Date



AIA® Document G704® – 2017

Certificate of Substantial Completion

PROJECT: *(name and address)*
Ozarka College New Technical Building

Melbourne, AR 72556

CONTRACT INFORMATION:
Contract For:

Date:
02-21-2025

CERTIFICATE INFORMATION:
Certificate Number:

Date:

OWNER: *(name and address)*
Ozarka College
218 College Drive
Melbourne, AR 72256

ARCHITECT: *(name and address)*
Architecture Plus, Inc.
907 South 21 st Street

CONTRACTOR: *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate. *(Identify the Work, or portion thereof, that is substantially complete.)*

ARCHITECT *(Signature)*

BY: Michael G. Johnson, AIA,
Secretary/Treasurer, Architecture Plus, Inc.
(Printed name, title, and license number if required)

Date Of Substantial Completion

WARRANTIES

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:
(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:
(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within () days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR *(Signature)*

BY: Contractor
(Printed name and title)

Date

OWNER *(Signature)*

BY: Ozarka College
(Printed name and title)

Date

AIA® Document G706® – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: <i>(Name and address)</i> Ozarka College New Technical Building Melbourne, AR 72556	ARCHITECT'S PROJECT NUMBER: 24-55	OWNER: []
	CONTRACT FOR:	ARCHITECT: []
TO OWNER: <i>(Name and address)</i> Ozarka College 218 College Drive Melbourne, AR 72256	CONTRACT DATED: 02-21-2025	CONTRACTOR: []
		SURETY: []
		OTHER: []

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment.
Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment [] Yes [] No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR:*(Name and address)*

CONTRACTOR'S Authorized Representative *(Signature)*

BY: Contractor

(Printed name and title)

Date

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:



AIA® Document G706®A – 1994

Contractor's Affidavit of Release of Liens

PROJECT: <i>(Name and address)</i> Ozarka College New Technical Building Melbourne, AR 72556	ARCHITECT'S PROJECT NUMBER : 24-55	OWNER: []
	CONTRACT FOR:	ARCHITECT: []
TO OWNER: <i>(Name and address)</i> Ozarka College 218 College Drive Melbourne, AR 72256	CONTRACT DATED: 02-21-2025	CONTRACTOR: []
		SURETY: []
		OTHER: []

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

CONTRACTOR'S Authorized Representative *(Signature)*

BY: Contractor

(Printed name and title)

Date

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

AIA® Document G707™ – 1994

Consent of Surety to Final Payment

PROJECT: <i>(Name and address)</i>	ARCHITECT'S PROJECT NUMBER:	OWNER: []
Ozarka College New Technical Building	24-55	ARCHITECT: []
Melbourne, AR 72556	CONTRACT FOR:	CONTRACTOR: []
	CONTRACT DATED:	SURETY: []
	02-21-2025	OTHER: []
TO OWNER: <i>(Name and address)</i>		
Ozarka College		
218 College Drive		
Melbourne, AR 72256		

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

on bond of
(Insert name and address of Contractor)

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall
not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, CONTRACTOR,

Ozarka College
218 College Drive
Melbourne, AR 72256

as set forth in said Surety's bond.

, OWNER,

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

Attest:
(Seal):

SURETY *(Signature)*

BY: Surety

(Printed name and title)

SECTION 010150 - CONTRACTOR'S USE OF THE PREMISES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: This Section applies to work requiring the Construction Manager, Contractor and/or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, to enter the Owner's existing facilities.
- B. **The Construction Manager shall be the final authority to establish, maintain and enforce all information within this Section.**
- C. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.
- B. Require that all personnel who will enter upon the Owner's existing facilities certify their awareness of and familiarity with the requirements of this Section.

1.3 TRUCK AND EQUIPMENT ACCESS

- A. To avoid traffic conflict, to maintain safety on the site, and to avoid overloading of streets and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the route designated at the Preconstruction Conference as the Contractor's Access Route.
- B. Provide adequate protection over existing paving and site improvements over or near which trucks and equipment pass to reach the job site.
- C. **NO VEHICLES SHALL PARK, USE OR TEMPORARILY BLOCK ACCESS INTO THE PROPERTY, DRIVES, PARKING LOTS, LAWNS AND ETC.**

1.4 CONTRACTOR'S VEHICLES AND PARKING

- A. Require Contractor's vehicles, vehicles belonging to employees of the Contractor, and all other vehicles entering upon the Owner's property in performance of the Work of the Contract, to use only the Access Route so designated.
- B. Do not permit such vehicles to park on any street or other area of the Owner's property except in the area so designated at the Pre-Construction Conference as "Contractor's Parking Area" on the Project Site. Use of the existing parking lot will be permitted.

1.5 CONTRACTOR'S STAGING AND STORAGE

- A. The staging and storage area shall be limited to the areas at each building site.
- B. **Any and all paved or lawn areas disturbed by the construction, and not shown on the Drawings to receive new work, shall be repaired at the contractor's expense to match pre-construction conditions.**

1.6 SECURITY

- A. Restrict the access of all persons entering upon the Owner's property, in connection with the Work, to the Access Route designated by the Construction Manager, and to the actual site of the Work.
- B. The Owner shall not be held responsible for Contractor's equipment and material stored at the site. Contractors shall secure their equipment, materials and etc through appropriate means.

END OF SECTION

SECTION 011210 - HAZARDOUS MATERIALS AND PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Contractor's responsibilities concerning asbestos containing materials (ACM) in the existing work area, buildings or systems where work is to occur.
- B. Contractor's responsibilities concerning asbestos in materials, products, and equipment used in the construction project.

1.2 DISCOVERY OF ASBESTOS CONTAINING MATERIALS (ACM) OR OTHER HAZARDOUS MATERIALS

- A. ACM'S/HAZARDOUS MATERIALS **ARE NOT KNOWN** to be present in the work area or systems where work is to occur.
- B. During the construction project, the Contractor shall notify the Owner and Architect of any portion of the work which the Contractor knows or has reason to believe contains asbestos/hazardous material. The Contractor shall take necessary precautions to prevent damage and release of asbestos fibers or other hazardous materials into the air or open water systems. The Contractor shall immediately stop work if he has reason to believe he is disturbing any ACM's/hazardous material and notify the Owner and Architect.
- C. Any asbestos abatement/hazardous material removal procedures shall be performed by the Owner, with a separate Contractor. The General Contractor shall coordinate his efforts with the contractor performing the asbestos abatement/hazardous material removal.

1.3 ASBESTOS CONTAINING MATERIALS AND PRODUCTS

- A. All building construction materials, products, and equipment used in the project shall be asbestos free.
- B. The Contractor shall be responsible for verifying with suppliers and manufacturers that construction materials, products and equipment used in completion of the project are asbestos free.
- C. Contractor shall provide certification (typewritten, signed and dated) to the Owner indicating that asbestos **FREE** materials, products, and equipment was used in execution/completion of the work.

PART 2 - PRODUCTS and PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 011520 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Comply with procedures described in this Section, and as required by the Construction Manager, when applying for progress payment and final payment under the Contract.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. The Contract Sum and the schedule for payments are described in the Form of Agreement.
 - 3. Payments upon Substantial Completion and Completion of the Work are described in the General Conditions.
 - 4. The Architect's approval of applications for progress payment and final payment may be contingent upon the Architect's approval of applications for progress payment and final payment may be contingent upon Architect's approval of compliance as stated in the General Conditions.

1.2 QUALITY ASSURANCE

- A. Prior to start of construction, secure the Architect's approval of the Schedule of Values required to be submitted as stated below and within the General Conditions.
- B. During progress of the Work, modify the Schedule of Values as approved by the Architect to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.
- C. Base requests for payment on the approved Schedule of Values.

1.3 SUBMITTALS

- A. Formal submittal: Unless otherwise directed by the Architect, submit request for each calendar month, not later than the 5th day of the following month.
 - 1. Make formal submittal of request for payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, "Application and Certificate for Payment," plus continuation sheet or sheets.
 - 2. Sign and notarize the Application and Certificate for Payment. The Application and Certificate for Payment MUST be notarized before submittal to the Architect.
 - 3. Submit the original of the Application and Certificate for Payment, plus two identical copies of the continuation sheet or sheets, plus an updated Construction Schedule to the Architect.
 - 4. The Architect will compare the formal submittal with the approved informal submittal and, when approved, will sign the application and Certificate for Payment, will make required copies, and will distribute:
 - a. One copy to Contractor;
 - b. One copy to Owner;
 - c. One copy to Architect's file.
 - 5. Owner will, upon approval, disburse directly to the Contractor.
 - 6. **EACH APPLICATION FOR PAYMENT MUST ALSO CONTAIN A CURRENT, UPDATED PROGRESS SCHEDULE/CONSTRUCTION SCHEDULE.**
 - 7. **EACH APPLICATION FOR PAYMENT SHALL HAVE 5% RETAINAGE UNTIL PROJECT COMPLETION.**
- B. Prior to the initial payment request, submit:
 - 1. **Schedule of Values**
 - 2. **Progress Schedule/Construction Schedule: As a minimum this shall show dates, in a bar graph form, of work to occur within the 16 major Divisions of the Specifications.**
 - 3. **Evidence of Insurance Coverages**
- C. **Construction Manager's Construction Schedule (GANTT Chart)**
 - 1. **Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, (or similar) Contractor's Construction Schedule within 15 days of date established for Commencement of**

the Work.

2. **The schedule shall be similar to the one following this Section, but must contain an “Actual” bar along with a “Scheduled” bar. The “Scheduled” bar shall not change throughout the project, except through an approved Change Order.**
 3. **The Construction Manager’s Schedule must be updated at least every 30 days and be submitted with each Application for Payment.**
- D. Following issuance by Architect of Certificate of Substantial Completion, Construction Manager may submit special payment request, provided the following items have been completed:
1. Obtains inspections and other approval by governing authorities required for Owner's occupancy and use of project.
 2. Submit warranties and similar documentation.
 3. Submit maintenance and operation manuals.
 4. Complete final cleaning of the work.
 5. Submit listing of work to be completed before final acceptance by the Owner.
- E. Following completion of the following requirements, final payment request may be submitted:
1. Complete work listed as incomplete at the time of Substantial Completion, or otherwise assure Owner of subsequent completion of individual incomplete items.
 2. Settle liens and other claims, or assure Owner of subsequent settlement.
 3. Submit proof of payment on fees, taxes and similar obligations.
 4. Transfer operational, access, security and similar provisions to Owner.
 5. Remove temporary facilities, materials, signs and similar items.

END OF SECTION

SECTION 012000 - PRE-BID MEETING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: To help clarify construction contract procedures and the Scope of the work, the Architect, Construction Manager, and/or Owner might conduct a Pre-Bid Meeting prior to submission of proposals/bid date. Contractor's submitting a Proposal (Bid) shall provide attendance by the designated personnel for their Proposal (Bid) to be accepted by the Owner. The Construction Manager will notify all contractors should a Pre-Bid Meeting be held for each site.
- B. Related Work:
 - 1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. **Information as may be issued by the Construction Manager. Any such information takes precedence.**

1.2 PRE-BID MEETING

A. AGENDA

- 1. Meeting Sign-in Sheet
 - a. Nothing stated at the conference will change the project documents unless a subsequent addendum is issued.
- 2. Date, Time, and Place of Bid Opening
 - a. Bids shall be in a sealed envelope with the name of Contractor, Contractor License Number, project name and date/time of bid opening, on the outside of sealed envelope.
 - b. Private or Public Bid Opening.
 - c. No bids will be accepted after bid time is called.
- 3. Review document: Common Bidding Mistakes
- 4. 5% bid bond or a cashier's check must accompany the bid.
- 5. Bid bond or cashiers check must be made payable to the Owner.
- 6. Requirement to discuss any conflict between the plans and specifications and/or the project requirements/site conditions with the Design Professional prior to the bid but no later than Two (2) days prior to the bid date.
- 7. Contractor's responsibility to visit project site and review contract documents before bidding project.
- 8. Plan issue date
- 9. List of Contractors
- 10. Addenda
- 11. Separate work items and/or contracts
- 12. Scope of work
- 13. Site conditions
 - a. Parking (restrictions or unrestricted)
 - b. Material storage requirements
 - c. Access to building/site
 - d. Use of facilities/site (restricted or unrestricted)
 - e. Protection of facilities and Equipment
 - f. Working on site (noise, safety requirement, hours etc.)
- 14. Schedule for completion
- 15. Liquidated damages
- 16. Site/facility walk through
- 17. Recap and questions

END OF SECTION

SECTION 012010 - PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: To help clarify construction contract administration procedures, the Construction Manager might conduct a Preconstruction Conference prior to start of the Work. Each contractor shall provide attendance by the designated personnel, if such a conference is held.
- B. Related Work:
 - 1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. **Any information as may be issued by the Construction Manager. Such info takes precedence.**

1.2 QUALITY ASSURANCE

- A. For those persons designated by the Construction Manager, his contractors, and suppliers to attend the Preconstruction Conference, provide required authority to commit the entities they represent to solutions agreed upon in the Conference.

1.3 SUBMITTALS

- A. To the maximum extent practical, advise the Construction Manager at least 24 hours in advance of the Conference as to items to be added to the agenda.
- B. The Construction Manager will compile Minutes of the Conference and will furnish copies of the Minutes to the Architect and the Owner. The Construction Manager may make and distribute such copies as is required.

1.4 PRECONSTRUCTION CONFERENCE

- A. The Conference will be scheduled to be held within 15 working days after the Owner and/or the Construction Manager has issued the Notice to Proceed.
- B. Attendance:
 - 1. Provide attendance by authorized representatives of the Construction Manager, Contractors and major suppliers.
 - 2. **Any secretarial staff, of the Contractors, responsible for preparing and/or submitting pay requests, change orders, etc. must attend meeting.**
 - 3. The Construction Manager will advise other interested parties, including the Owner, and request their attendance.
- C. Minimum Agenda: Data will be distributed and discussed on:
 - 1. Organizational arrangement of the Construction Manager and each Contractor's forces and personnel, and those of subcontractors, materials suppliers and the Architect;
 - 2. Channels and procedures for communication;
 - 3. Construction schedule, including sequence of critical work and phasing;
 - 4. Contract Documents, including distribution of required copies of Drawings and revisions.
 - 5. Processing of Shop Drawings and other data submitted to the Architect for review.
 - 6. Processing of field decisions and Change Orders;
 - 7. Rules and Regulations governing performance of the Work; and
 - 8. Procedures for safety and first aid, security, quality control, housekeeping and related matters.
 - 9. "As-Built" Drawings, Project Close-Out Documents.
 - 10. Contractor Storage, Parking and Staging areas.
 - 11. Bi-weekly meetings with the Owner, Architect, Construction Manager, Contractors and Sub-Contractors.

END OF SECTION

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. See Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 DEFINITIONS

- A. 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 modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Should quantities of work be increased or decreased from those on which the Base Bid is based, the undersigned agrees that the following supplemental Unit Prices will be the basis of payment to him or credit to the Owner. No additional adjustment is allowed for overhead, profit, insurance or other direct or indirect expenses of Contractor or Subcontractor.

ITEM	UNIT	PRICE
1. Excavating, Filling, Compacting	Cubic Yard	\$ _____

If in order to obtain suitable bearing for building foundations, slabs and/or paving slabs, it is necessary to perform additional work associated with the Excavating, Filling and Compacting of the site other than those shown on the Drawings, and/or as described in the Technical Specifications, Sections 311000, 312000, 312300 Bidder agrees to adjust the Contract amount by the above amount.

The above unit price applies to both increases and decreases in the amount of Work and includes all costs to the Owner including excavation, removal from site, backfill, compacting, overhead and profit. Only one price will be accepted. If this Unit Price is necessary for the performance of the Work, the cubic yardage used for any contract modification shall be the removed amount and not the replaced and compacted amount. Any contract modification must receive Owner approval prior to any work occurring which is associated with the contract modification.

	ITEM	UNIT	PRICE
2	Rock Excavation	Cubic Yard	\$ _____

If in order to obtain suitable trench depths and widths, for additional work not shown or stated within the construction documents, it is necessary to perform additional work associated with trenching of the site for building foundations, pipe/conduit trenches and etc. other than those shown on the Drawings, and/or as described in the Technical Specifications, Bidder agrees to adjust the Contract amount for the work as described on the Drawings and in Section 312300 of the Technical Specifications by the above amount.

END OF SECTION

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. See Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.
- C. See Division 01 Section "Unit Prices" for administrative requirements for using unit prices.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions to the Construction Manager authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on **AIA Document G710, "Architect's Supplemental Instructions"**.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue to the Construction Manager, a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time for individual contractors. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within **5 days** after receipt of Proposal Request, for individual contractors submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. The Construction Manager will present this information to the Architect and Owner.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Construction Manager and/or Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Construction Manager and/or Contractor may propose changes by submitting a request for a change to Architect and Owner.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Construction Manager's and Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use **AIA Document G709 for Proposal Requests**.

1.4 ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within **5** days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than **21** days after such authorization.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Construction Manager on **AIA Document G701**.

1.6 CONSTRUCTION CHANGE DIRECTIVE (AKA: ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS)

- A. **Construction** Change Directive: Architect may issue a **Construction** Change Directive on **AIA Document G714**. **Construction** Change Directive instructs the Construction Manager to instruct a Contractor to proceed with a change in the Work, for potential subsequent inclusion in a Change Order.
 - 1. **Construction** Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine potential change in the Contract Sum or the Contract Time.
- B. Documentation: Construction Manager shall maintain detailed records on a time and material basis of work required by the **Construction** Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 REQUEST FOR INFORMATION (RFI)

- A. The Construction Manager shall submit to the Architect any construction item, system or procedure within the construction documents that requires clarification. The RFI might result in a Proposal Request or Change Order or Construction Change Directive to be issued.

1.8 CHANGE ORDERS, PROPOSAL REQUESTS AND CONSTRUCTION CHANGE DIRECTIVES RECORDS

- A. **The Construction Manager shall maintain Change Orders, Proposal Requests, Construction Change Directives and Request for Information.**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012660 - CHANGE ORDER PROCEDURE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in written Change Orders signed by the Construction Manager, Owner and the Architect and issued after execution of the Contract, in accordance with the provisions of this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Changes in the Work are described further in Article 7 of the General Conditions.
 - 3. Architect's Supplemental Instructions:
 - a. From time to time during progress of the Work the Architect may issue a "Supplemental Instructions" which interprets the Contract Documents or orders minor changes in the Work without change in Contract Sum or Contract Time.
 - b. Should the Contractor consider that a change in the Contract Sum or Contract Time is required, he shall submit an itemized proposal to the Architect immediately and before proceeding with the Work. If the proposal is found to be satisfactory and in proper order, the Supplemental Instructions will be superseded by a Change Order.
 - 4. Proposal Requests:
 - a. From time to time during progress of the Work the Architect may issue a "Proposal Request" for an itemized quotation for changes in the Contract Sum and/or Contract Time incidental to proposed modifications to the Contract Documents.

1.2 QUALITY ASSURANCE

- A. Include within the Construction Manager's quality assurance program such measures as are needed to assure familiarity of the Construction Manager's staff and employees with these procedures for processing Change Order data.

1.3 SUBMITTALS

- A. Make submittals directly to the Architect at the address shown in the Project Manual.

1.4 PRODUCT HANDLING

- A. **The Construction manager shall maintain a "Register of Proposal Requests, Supplemental Instructions and Change Orders" at the job site, accurately reflecting current status of all pertinent data.**

1.5 PROCESSING CHANGES INITIATED BY THE OWNER

- A. Should the Owner contemplate making a change in the Work or a change in the Contract Time of Completion, the Architect will issue a "Proposal Request" or "Supplemental Instructions" to the Construction Manager.
- B. If the Construction Manager has been directed by the Architect to make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion, but the Construction Manager wishes to make a claim for one or both of such changes, the Construction Manager shall proceed with the change and shall notify the Architect as provided for under Article 7 of the General Conditions.
- C. If the Construction Manager has been directed by the Architect to make the described change subject to later determination of cost or credit in accordance with Article 7 of the General Conditions, the Construction Manager shall:
 - 1. Take such measures as needed to make the change;

2. Consult with the Architect and reach agreement on the most appropriate method for determining credit or cost for the change.
 - D. If the Construction Manager has been directed by the Architect to promptly advise him as to credit or cost proposed for the described change, the Construction Manager shall:
 1. Analyze the described change and its impact on costs and time;
 2. Secure the required information and forward it to the Architect for review;
 3. Meet with the Architect as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective;
 4. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Architect in writing when such avoidance no longer is practicable.
- 1.6 PROCESSING CHANGES INITIATED BY THE CONSTRUCTION MANAGER AND/OR INDIVIDUAL CONTRACTOR
- A. Should the Construction Manager and/or individual Contractor discover a discrepancy among the Contract Documents, a concealed condition as described in Paragraph 4.7.6 of the General Conditions, or other cause for suggesting a change in the Work, a change in the Contract Sum, or a change in the Contract Time of Completion, he shall notify the Architect as required by pertinent Sections of the Contract Documents.
 - B. Upon agreement by the Architect that there is reasonable cause to consider the Construction Manager and/or individual Contractor's proposed change, the Architect will issue a Proposal Request in accordance with the provisions described in subparagraph 1.1.B.4 above.
- 1.7 PROCESSING PROPOSAL REQUESTS
- A. The Construction Manager shall make written reply to the Architect in response to each Proposal Request.
 1. State proposed change in the Contract Sum, if any. Any and all additional costs shall be itemized, by both the general contractor and subcontractors, to clearly and completely show all materials, both quantities and unit costs, and labor costs.
 2. State proposed change in the Contract Time of Completion, if any.
 3. Clearly describe other changes in the Work, if any, required by the proposed change or desirable therewith.
 4. Include full backup data such as a subcontractor's letter of proposal or similar information.
 5. Submit this response in single copy.
 - B. When cost or credit for the change has been agreed upon by the Owner and the Construction Manager, or the Owner has directed that cost or credit be determined in accordance with provisions of Article 7 of the General Conditions, the Construction Manager will issue a "Change Order" to the Owner.
- 1.8 PROCESSING CHANGE ORDERS
- A. Change Orders will be dated and will be numbered in sequence.
 - B. The Change Order will describe the change or changes, will refer to the Proposal Requests or Supplemental Instructions involved, and will be signed by the Owner and the Architect.
 - C. The Construction Manager will issue three copies of each Change Order to the Architect and Owner for review and signatures.

END OF SECTION

SECTION 012973- SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Contractor shall provide a detailed breakdown of the agreed Contract Sum to the Architect showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, Division 0 and Sections in Division 1 in these Specifications.
 - 2. Schedule of Values is required under the General Conditions of Division 0.
 - 3. Schedule of Values is required to be compatible with the "continuation sheet" accompanying applications for payment, as described in Specification Section 011520 - Applications for Payment.

1.2 QUALITY ASSURANCE

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so requested by the Architect, provide copies of the subcontracts or other data acceptable to the Architect and/or Owner, substantiating the sums described.

1.3 SUBMITTALS

- A. Ten days prior to first application for payment, submit a proposed Schedule of Values.
 - 1. Meet with the Architect and determine additional data, if any, required to be submitted.
 - 2. Secure the Architect's approval of the Schedule of Values prior to submitting first application for payment.
- B. **SCHEDULE OF VALUES SHALL BE IN FORMAT AS PER FORMS FOLLOWING THIS SECTION, DELETING, ADDING OR MODIFYING LINE ITEMS AS MAY BE REQUIRED TO ACCURATELY AND THOROUGHLY DESCRIBE THE WORK. (THIS FORM IN AN ELECTRONIC FORMAT, WHICH IS AN EXCEL PROGRAM, CAN BE REQUESTED FROM THE ARCHITECT.)**
- C. **ALL INFORMATION ON THE SCHEDULE OF VALUES SHALL BE TYPE SIZE ARIAL 10, OR LARGER. IF NOT, IT WILL BE RETURNED TO THE CONTRACTOR FOR REVISION AND RESUBMITTAL.**

END OF SECTION

Schedule of Values

Project: New Technical Building
 Location: Ozarka College - Melbourne, Arkansas
 Contractor:

Architect's
 Project No.: 24-55
 Date:

Item Division	Description of Work	Scheduled Value	Work Completed					Work Remaining	
			Previous Application	This Application Work In Place	Stored Materials	Total Completed and Stored	%	Balance to Finish	Retainage
Div. 1	General Conditions								
1.0	Overhead								
1.1	Bonds & Insurance								
1.2	Permits & Fees								
1.3	Field Supervision								
1.4	Profit								
1.5	Cash Allowances								
Div. 2	Sitework								
2.0	Paving (off-site)								
2.1	Utilities (off-site)								
2.2	Clearing & Grubbing								
2.3	Demolition								
2.4	Earthwork (develop.)								
2.5	Earthwork (finish)								
2.6	Utilities (on-site)								
2.7	Storm Drainage								
2.8	Electrical (site)								
2.9	Paving								
2.9A	Paving - Concrete								
2.9B	Paving - Asphalt								
2.10	Exterior signage								
2.11	Fences & Gates								
2.12	Landscaping								
Div. 3	Concrete								
3.0	Site Concrete-Walks								
3.1	Building Concrete - Foundations								
3.2	Building Concrete - Slabs and Dock								
Div. 4	Masonry								
4.0A	Masonry - CMU								
4.0B	Masonry - Brick								
Div. 5	Metals								
5.0	Structural Steel/Misc. Steel								
5.2	Handrails & Railings								
Div. 6	Wood & Plastics								
6.0	Rough Carpentry								
6.1	Finish Carpentry								
6.2	Casework/Millwork								

Item Division	Description of Work	Scheduled Value	Work Completed					Work Remaining	
			Previous Application	This Application		Total Completed and Stored	%	Balance to Finish	Retainage
				Work In Place	Stored Materials				
Div. 7	Thermal & Moisture								
7.0	Roofing System - Metal								
	Bldg Insulation & V.B. -								
7.1	Roof								
	Bldg Insulation & V.B. -								
7.2	Walls								
7.3	Roofing Accessories								
7.4	Sealants and Caulking								
7.5	Membrane Waterproofing								
Div. 8	Doors & Windows								
8.0	Doors & Frames								
8.1	Overhead Doors & Grilles								
8.2	Specialty Doors								
8.3	Storefronts (Alum.)								
8.4	Hardware								
8.5	Other Glazing								
Div. 9	Finishes								
9.0	Gypsum Board & Metal Studs								
9.1	Ceramic Tile								
9.2	Acoustical Ceiling								
9.4	Resilient Flooring & Base								
9.5	Painting								
9.6	Carpet								
9.7	FRP								
	Concrete Floor								
9.8	Polishing/Sealing								
Div. 10	Specialties								
10.0	Toilet Accessories								
10.1	Entry Mats								
10.2	Interior Signage								
10.3	Lockers								
10.4	Misc. Specialties								
Div. 11	Equipment								
	Installation of Owner's								
11.0	Equipment								
Div. 12	Furnishings								
12.0	Window Treatment								
Div. 13	Special Construction								
13.0	P.E.M.B - Materials								
13.1	P.E.M.B - Erection								
13.2	Canopies								
13.3	Fire Suppresssion - Site								
	Fire Suppression -								
13.4	Building Materials								
	Fire Suppression -								
13.5	Building Install								

SCHEDULE OF VALUES

01370-3

Item Division	Description of Work	Scheduled Value	Work Completed					Work Remaining	
			Previous Application	This Application Work In Place	Stored Materials	Total Completed and Stored	%	Balance to Finish	Retainage
Div. 14	Conveying Systems								
Div. 15	Mechanical								
15.0	Plumbing - Rough-in								
15.1	Plumbing - Top-out								
15.2	HVAC System - Units								
15.3	HVAC Test & Balance								
15.4	HAVC System - Ductwork								
Div. 16	Electrical								
16.0	Electrical Power - Switch Gear								
16.1	Electrical Power - Conduit, Fittings & Wire								
16.2	Electrical Lighting-Fixtures								
16.3	Fire Alarm System								
16.4	Telephone/Data System								
Subtotal	Site Development	\$ -	#2.0, #2.1, #2.2, #2.3 and #2.4						
	Site Improvement	\$ -	#2.5, #2.6, #2.7, #2.8, #2.9, #2.10, #2.11, #2.12 and #3.0						
	Building	\$ -	Construction costs not including Sitework cost						
	Total	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -

SECTION 013113 - COORDINATION

PART 1 - GENERAL

1.1 EXAMINATION

- A. Each contractor, subcontractor, or supplier shall thoroughly examine the drawings and specifications pertaining to separate contracts and include in his base bid those items for which he will be responsible and for the proper coordination of the work to be performed.

1.2 TRANSITIONS

- A. The architect accepts no responsibility for the naming of every item that may be needed to make transitions from the work of one contractor to another. All such transitions shall be the entire responsibility of the contractor, subcontractor, and materials and equipment suppliers involved.

1.3 SCHEDULES

- A. General contractor shall coordinate the scheduling of all work.

1.4 LOCATION OF WORK

- A. The contractor shall check and verify all measurements and dimensions shown on contract drawings and shop drawings of all the work as it progresses.
- B. The proper location of work of all subcontractors, including supports for equipment shall be the final conclusive responsibility of the general contractor regardless of who is responsible for the layout of the work in the first instance.

1.5 UNLOADING AND HOISTING MATERIALS

- A. The contractor, each subcontractor, and each supplier of materials and equipment shall be responsible for the hoisting of their materials and equipment to the proper location for installation on the project.
- B. They shall also be responsible for unloading of all materials and equipment at the job site.

1.6 STORAGE OF MATERIALS

- A. General contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and equipment and coordinate the storage and execution of their work with his.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013119 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Preconstruction Meeting
- B. Progress Meetings
- C. Pre-installation Meetings

1.2 PRECONSTRUCTION MEETING

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required: Owner, Architect, Contractor, Contractor's Superintendent, and major subcontractors.
- C. Agenda:
 - 1. Designation of personnel representing the parties in Contract and the Architect.
 - 2. Procedures and processing of field decisions, submittals, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 3. Scheduling.
 - 4. Use of the premises by Owner and Contractor.
 - 5. Owner's requirements.
 - 6. Construction facilities and controls provided by Owner.
 - 7. Temporary utilities.
 - 8. Security and housekeeping procedures.
 - 9. Procedures for testing.
 - 10. Maintaining record documents.
 - 11. Inspection and acceptance of equipment put into service during construction.
- D. **General Contractor is to record minutes and distribute copies within two days after meeting to all attendees with two copies to Architect/Engineer, and those affected by decisions made.**

1.3 PROGRESS MEETINGS

- A. **The General Contractor is to schedule and administer meetings throughout progress of the Work.**
 - 1. Progress meetings to be held monthly, at the job site, until the project is fifty percent complete.
 - 2. After project completion reaches fifty percent, progress meetings are to be held every two weeks.
- B. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job Superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.

9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

E. Contractor shall record minutes and distribute copies within two days after meeting to participants.

1.4 PREINSTALLATION MEETING

- A. When required in individual specification sections, the General Contractor is to convene a preinstallation meeting at the site prior to commencing work of the section
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four (4) days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. **Contractor shall record minutes and distribute copies within two days after meeting to participants.**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013216 – CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 SCHEDULE

- A. Prior to the start of any work, prepare and submit for architect's approval a projected construction schedule for the entire work.
- B. The schedule shall indicate the dates for the starting and completion of various stages and sequencing of construction and shall be revised monthly. Submit with contractor's Application for Payment each month.

1.2 FORM

- A. Prepare schedule in the form of a horizontal bar chart providing:
 - 1. Separate horizontal bar column for each major specification section.
 - 2. Place in chronological order of beginning of each item of work.
 - 3. Identify each horizontal bar:
 - a. By major specification section
 - b. By distinct graphic delineation
 - 4. Horizontal time scale (weeks)
 - 5. Allow space for denoting of actual progress of the work.
 - 6. Minimum sheet size: 8-1/2" x 14". Maximum sheet size: 11' x 17".

1.3 SCHEDULE UPDATE

- A. Update schedules accurately indicating the progress to first day of each month and submit monthly with Application and Certificate for Payment. Updated schedules are to be distributed at monthly progress meetings to all attendees.
- B. **The original schedule shall always be shown on the monthly updated schedules. The bar chart and data shall always show (state), the original schedule and the revised schedule. Thus, showing how the schedule has, or has not, changed over time (each month).**

END OF SECTION

SECTION 013400 - SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Make electronic submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Individual requirements for submittals also may be described in pertinent Sections of these Specifications.
- C. Work not included:
 - 1. Unrequired submittals will not be reviewed by the Architect.
 - 2. The Construction Manager may require his Contractors and/or subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the Work but such data shall remain between the Construction Manager and his Contractors and/or subcontractors and will not be reviewed by the Architect.

1.2 QUALITY ASSURANCE

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
 - 2. Verify that each item and the submittal for it conform in all respects with specified requirements, by affixing the Construction Manager's signature to each submittal, certify that this coordination has been performed.
- B. Substitutions:
 - 1. The Contract is based on the standards of quality established in the Contract Documents. Substitutions will be considered only when listed at time of bidding, on the form provided therefore in the bidding documents, and when substantiated by the Contractor's submittal of required data within 35 calendar days after award of the Contract.
 - 2. The following products do not require further approval except for interface with the Work:
 - a. Products specified by reference to standard specifications such as ASTM and similar standards.
 - 3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved in writing for this Work by the Architect.
- C. "Or equal":
 - 1. Where the phrase "or equal," or "or equal as approved by the Architect," occurs in the Contract Documents, do not assume that the materials will be approved as equal unless the item has been specifically so approved for this Work by the Architect.
 - 2. The decision of the Architect shall be final.

1.3 SUBMITTALS

- A. Make submittals of Shop Drawings, Samples, substitution requests, and other items in accordance with the provisions of this Section.

PART 2 - PRODUCTS

2.1 GENERAL

- A. IT IS THE DESIRE OF THE ARCHITECT TO HAVE ALL SHOP DRAWINGS, SUBMITTALS AND ETC., SUBMITTED ELECTRONICALLY VIA EMAIL. DOING SUCH WILL REQUIRE ONLY ONE (1) ELECTRONIC COPY, IN A PDF FORMAT, TO BE SUBMITTED. IF SUCH IS NOT DONE, THEN THE BELOW INFORMATION APPLIES TO "PAPER" COPIES.**

2.2 SHOP DRAWINGS

- A. Scale and measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- B. Number of prints required:
1. Architect will retain two (2) copies of all material submitted except that three (3) copies of all material submitted pertaining to Structural, Mechanical and Electrical items will be retained. Contractor will submit as many additional copies for approval as he determines to need to execute the project.
 2. All shop drawings for structural steel, trusses, architectural woodwork, metal door and frames, aluminum frames or any other submittals that are drawings shall be submitted as one (1) reproducible, if larger than 8 1/2 x 14, and one (1) copy. All other forms of submittals will be rejected.

2.3 MANUFACTURERS' LITERATURE

- A. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents is being submitted for review.
- B. Submit the number of copies which are required to be returned, plus two copies which will be retained by the Architect.

2.4 SAMPLES

- A. Provide Sample or Samples identical to the precise article proposed to be provided. Identify as described under "Identification of Submittals" below.
- B. Number of Samples required:
1. Unless otherwise specified, submit Samples in the quantity which is required to be returned, plus one which will be retained by the Architect.
 2. By prearrangement in specific cases, a single Sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Architect.

2.5 COLORS AND PATTERNS

- A. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Architect for selection.

PART 3 - EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS (also required if submitted electronically, via email.)

- A. Proper identification of each item submitted shall be made by transmitting the following information, as a minimum. Submittals without such identification may be rejected as not complying with the provisions of**

the Contract.

- B. Each item submitted shall be properly identified by transmitting a cover sheet with the following information, as a minimum.**
- 1. Full Name of project as identified on the Contract Documents (Drawings and Specifications)**
 - 2. Name, address, phone, fax and email of Construction Manager and Contractor**
 - 3. Name of Architect**
 - 4. Name, address, phone, fax and email of Subcontractor and/or Supplier**
 - 5. Date of Submittal**
 - 6. Specification Section of item being submitted**
 - 7. Paragraph reference of item being submitted, for example: Section 09310 - Ceramic Tile, Floor Tile, Para. 2.1.B.**
 - 8. Number of copies being transmitted. Refer to paragraph 2.2.B. above for minimum number of copies required.**
 - 9. Affix a copy of the cover sheet to samples of oversize materials, color charts, etc. which relate to a submittal.**
 - 10. Each cover sheet shall have a 3" x 4" blank area for the Architect's submittal review stamp.**

3.2 GROUPING OF SUBMITTALS

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.**
- 1. Partial submittals may be rejected as not complying with the provisions of the Contract.**
 - 2. The Contractor may be held liable for delays so occasioned.**

3.3 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.**
- B. In scheduling, allow at least ten working days for review by the Architect following his receipt of the submittal.**

3.4 ARCHITECT'S REVIEW

- A. Review by the Architect does not relieve the Contractor from responsibility for errors which may exist in the submitted data, or any conflicts between the submitted data and the Construction Documents.**
- B. Revisions:**
- 1. Make revisions required by the Architect.**
 - 2. If the Contractor considers any required revision to be a change, he shall so notify the Architect as provided for in Article 7 of the General Conditions.**
 - 3. Make only those revisions direct or approved by the Architect.**

END OF SECTION

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality Control and control of installation.
- B. Tolerances
- C. References
- D. Testing and inspection services.
- E. Examination
- F. Preparation

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturer's instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification of Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. ASTM E 329 – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction.
- B. ASTM C 1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

- C. ASTM D 3740 – Standard Practice for Minimum Requirements for Agencies Engaged in the Test and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- D. For products or workmanship specified by association, trade, or other consensus standards comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- E. Conform to reference standard by date of issue current on date for receiving bids, except where as specified date is established by code.
- F. Obtain copies of standards where required by product specification sections.
- G. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- H. Neither the contractual relationships, duties, or responsibilities of the parties in the Contract nor those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 TESTING AND INSPECTION AGENCIES

- A. As indicated in individual specification sections, Contractor shall employ and pay for services of an independent testing agency to perform specified testing.
- B. Testing agency selected must be approved by the Owner/Architect.
- C. Inspection Agency: Comply with requirements of ASTM D3740, ASTM E329, and ASTM C1077.
- D. Laboratory: Authorized to operate in the State of Arkansas.
- E. Laboratory Staff: Maintain a full time registered engineer on staff to review services.
- F. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under and laboratory measurement quality assurance program.
- G. Concrete Field Tests
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician Grade 1, According to ACI CP-1 or an equivalent certification program.

1.6 TESTING AND INSPECTION SERVICES

- A. Contractor shall employ and pay for services of an independent testing agency or laboratory acceptable to the Owner to perform specified testing.
 - 1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the Architect/Engineer.
 - 1. Laboratory: Authorized to operate in location in which Project is located.
 - 2. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

- C. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Architect/Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Payment for re-testing or re-inspection will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
- H. Agency Responsibilities:
 - 1. Test Samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect/Engineer and Contractor or observed irregularities or non-conformance of Work or products.
 - 6. Perform additional tests required by Architect/Engineer.
 - 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After test, promptly submit copy of report to Architect/Engineer and to Contractor via email. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Location in the Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Contract Documents.
- J. Limits on Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume any duties of Contractor.
 - 4. Agency or laboratory has no authority to stop the Work.
 - 5. Agency has not authority to authorize additional Work.
- K. Contractor's Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work.
 - 3. Provide incidental labor and facilities:

- a. To provide access to Work to be tested/inspected.
- b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
- c. To facilitate tests/inspections.
- d. To provide storage and curing or test samples.
4. Notify Architecture Plus and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified test laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

1.7 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instruction when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 013320 – Shop Drawings. Project Data, and Samples, manufacturer's field reports article.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

- A. Clean Substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply Manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to product Work of specified quality.

- B. Comply with manufacturer's instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

3.4 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architecture Plus, it is not practical to remove and replace the Work, Architecture Plus will direct an appropriate remedy or adjust payment.

3.5 ACCESS SECURITY SYSTEM WARRANTY, MAINTENANCE AND TRAINING

A. ACCESS SECURITY SYSTEM SUBCONTRACTOR

- 1. Work and all Electronic Security Systems/Access Control Equipment intended to be provided under a contractor specializing in security electronic systems installation with single responsibility for detailing, coordinating, installing, and interfacing of specified security systems.
 - a. The Electronic Systems Subcontractor is responsible for providing and installing all devices and components included in the systems specified within this section; providing, pulling and connecting all low voltage and fiber optics wiring to all system components from the power source, as well as between all system components, and provide, install and connect wiring to components which directly interface with monitoring, communications, alarm and control devices provided as part of the Security Electronics Systems/Access Control System.

B. WARRANTY

- 1. Period: The Contractor shall guarantee all labor, workmanship, and materials for a period of one (1) year from the date of Final Acceptance. Should failure occur within the first year to the system and/or any individual component the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this Contract, at no cost to the Owner.
- 2. The Contractor shall provide local service by factory trained personnel from an authorized dealer of the equipment manufacturer. The Contractor shall provide written proof from the equipment manufacturer that said Contractor is duly authorized to sell, service and maintain the specified products. The dealer shall have available stock of the manufacturer's standard parts for the primary system components and devices. The local office shall carry a sufficient inventory of spare parts to cover no less than 50% parts service within 24 hours and 75% within 72 hours. The inventory of spare parts requirement is assuming availability of components through a dealer network and/or obtained from respective manufacturers within the required time frame.
- 3. The Contractor shall offer an "Optional Three (3) Year Maintenance After Warranty" and an "Optional Five (5) Year Maintenance After Warranty" package to the Owner. The Owner shall inform the Contractor of the acceptance or rejection of the package at the time of Final Acceptance.
- 4. Provide a written warranty, covering all systems subject to the requirements of this section, signed by the Contractor and Installer, agreeing to repair or replace defective materials and workmanship of work during a One (1) Year warranty period. The term "defective" is defined to include:

- a. Abnormal deterioration.
- b. Failure of the system to meet performance requirements.
5. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

C. MAINTENANCE

1. Spare Parts

- a. The Contractor shall furnish spare parts for all security systems/access control and equipment. The intent of the spare parts inventory is to allow the immediate replacement of failed or faulty components to the lowest level of field repair to maintain system-operating integrity. Any spare parts used throughout the duration of this Project shall be replaced prior to Final Acceptance. Furnish spare parts as indicated on provided device and component schedules.
- b. Deliver spare parts to Owner, at project, wrapped for storage and completely labeled. Provide two (2) spare parts of each specified piece of equipment, or each piece installed within the work.

D. FINAL TESTING AND ACCEPTANCE

1. The Contractor shall develop a Final Test and Acceptance (FTAA) Plan. The plan shall identify each component of the system, intent of test, method or methods of test and expected results. Each component listed in the plan shall include space for test part signatures, brief comments, time of test and pass/fail check boxes. The FTAA plan shall be submitted to the owner's representative 30 days prior to the scheduled final test.
2. Provide manufacturer's supervision of final testing of each system.
3. Each system must test free from interference, opens, grounds, and short circuits.

E. OPERATIONAL DEMONSTRATION TEST (BURN-IN)

1. Following completion of the Final Test, the system shall undergo a thirty (30) day Operational Demonstration Test (ODT) or Burn-In period. This operational demonstration period shall start when all specified systems and equipment have been installed and "Substantial Completion" is reached with only a moderate number of punch list items remaining. During this period, the system shall be operated under a normal facility traffic load for no less than 30 days. If any item or system fails during the ODT, the 30-day burn-in period shall be suspended for that item until repaired or replaced. Once repaired or replaced, the burn-in period shall recommence. Final system acceptance of the entire project shall be withheld until after successful completion of this operational demonstration period for all systems and components.

F. OWNER PERSONNEL TRAINING

1. Operator Training: Instruct operating staff in proper operation, including hands-on training.
 - a. Minimum of twenty-four (24) man-hours covering the operations for each system installed.
 - b. Training sessions shall be provided to supervisors, staff utilizing systems and equipment provided under this section, maintenance personnel and any other personnel designated by the Owner. Contractor should prepare to provide operator training for up to ten (10) personnel.
 - c. Contractor shall be prepared to provide training sessions on all work shifts, including day, evening and night shifts.
2. Administrator Training: Instruct owner-designated security system administrators for each system installed.
 - a. Minimum of twenty-four (24) man-hours of training for each owner-designated individual.
 - b. Training to cover all administrative and management functions, features and controls for each system.
3. Refresher Training: Provide a 90-day Refresher Training Session to operators and administrators.
 - a. Minimum of eight (8) hours of training for each owner-designated individual.
 - b. Training shall cover summaries of all operator and administrator training topics and shall include greater detail on subject areas or operations not yet mastered by operators or administrators.
4. Review in detail all information in the Operations and Maintenance Manuals for each system provided.
5. Prior to administering the above training, the Contractor(s) shall prepare an outline of the training, identifying the goals and expectations of the course and detailing what students are expected to learn.
6. Training courses shall be videotaped for subsequent training use by the Owner.

G. ACCEPTANCE

1. System Warranty shall not start until Acceptance. Acceptance shall be withheld until the following activities have been successfully completed:
 - a. Acceptance of all submittals.
 - b. Delivery of final documentation.
 - c. Successful Final Test and Inspection.
 - d. Successful Operational Demonstration Test.
 - e. Successful training and demonstration, including operation of systems using the manuals.

END OF SECTION

SECTION 014100 - TESTING LABORATORY SERVICES (CONTRACTOR PAYS)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included:
 - 1. Provide such testing and inspecting as are specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Requirements for testing may be described in various Sections of these Specifications.
 - 3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be by the Owner.

1.2 QUALITY ASSURANCE

- A. The testing laboratory selected by the Contractor will be qualified to the Architect's approval.
- B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.
- C. Inspections, tests, and related actions specified in the Section and elsewhere in the Contract Documents are not intended to limit the Contractor's own quality control procedures which facilitate overall compliance with requirements of the Work.

1.3 RESPONSIBILITIES

- A. **THE CONTRACTOR WILL ENGAGE AND PAY FOR THE SERVICES OF AN INDEPENDENT AGENCY TO PERFORM INSPECTIONS AND TESTS THAT ARE SPECIFIED WITHIN VARIOUS SECTIONS OF THIS PROJECT MANUAL, OR AS MAY BECOME REQUIRED BY THE WORK AND REQUIRED BY THE OWNER AND/OR ARCHITECT. THE CONTRACTOR SHALL PAY FOR ALL RETESTING FOR WORK THAT FAILED THE ORIGINAL TEST. AS A MINIMUM TESTING WILL BE REQUIRED FOR WORK IN CONNECTION WITH SECTIONS 033000, 051200, 133419, 139150, 159500, 167110, and 312600.**

PART 2 - PRODUCTS

(Not applicable)

PART 3 - EXECUTION

(Not applicable)

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: The Contractor will provide temporary facilities and controls needed for the Work including, but not necessarily limited to the following. However, the Contractor can provide other temporary facilities as required by the performance of his work, and as approved by the Construction Manager.
 - 1. Temporary utilities.
 - 2. Field office for the Contractor's personnel;
 - 3. Sanitary facilities;
 - 4. Enclosures such as tarpaulins, barricades, and canopies;
 - 5. Project Sign
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Except that equipment furnished by subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the Work are not part of this Section.
 - 3. Permanent installation and hookup of the various utility lines are described in other Sections.

1.2 PRODUCT HANDLING

- A. Maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

PART 2 - PRODUCTS

2.1 UTILITIES

- A. Telephone:
 - 1. **Make necessary arrangements and pay costs for installation and operation of telephone and fax (or email service) service to the Contractor's office at the site. The requirement is above and beyond the job superintendent's cell phone.**
 - 2. **Make the telephone available to the Architect for use in connection with the Work.**
 - 3. **The telephone, fax and job superintendent's cell phone shall be capable of both sending and receiving local and long distance phone calls.**
- B. Water:
 - 1. The Owner will provide and pay for water used in the construction.
- C. Electricity:
 - 1. Provide necessary temporary wiring and, upon completion of the Work, remove such temporary facility.
 - 2. Provide area distribution boxes so located that the individual trades may furnish and use 100 foot maximum length extension cords to obtain power and lighting at points where needed for work, inspection, and safety.
 - 3. The Contractor shall provide and pay for temporary electrical service and lighting sufficient to meet OSHA regulations.
- D. Heating:
 - 1. Provide, maintain and pay for all temporary heat necessary for proper conduct of operations needed in the Work.
 - 2. Contractor shall pay for the temporary heat.

2.2 FIELD OFFICES AND SHEDS

- A. Contractor's facilities:
 - 1. Contractor shall provide a field office building and sheds adequate in size and accommodation for Contractor's offices, supply, and storage.
- B. Sanitary facilities:
 - 1. Contractor shall provide temporary sanitary facilities in the quantity required for use by all personnel.
 - 2. Maintain in a safe (OSHA) and sanitary condition at all times.

2.3 ENCLOSURES

- A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, barricades, platforms, bridges, and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.
- B. Contractor shall provide a positive barricade (orange, plastic safety fencing as a minimum) that is obvious to the public at the extents of the construction area. **Provide temporary 4' high chain link fence along "contractor storage/staging" boundary or other locations as shown on the drawings, or other locations as determined at the preconstruction meeting.**

2.4 PROJECT SIGNS

- A. Contractor shall provide and erect a job sign describing the project. Design of sign will be as provided by Architect and will not exceed 4' x 8', with 4 colors. The information on the sign will include as a minimum: Project Name, Architect's Name and Logo, Contractor's Name, Owner's Name, Owner's logo, and color rendering of the building.
- B. Upon completion of the Work, remove the job sign.
- C. No other signs will be permitted.

PART 3 - EXECUTION

3.1 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.
- B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE

- A. Under regulation of the Arkansas Department of Pollution Control and Ecology, the Construction Manager or an individual contractor shall be responsible for implementing pollution control methods for controlling storm water run-off from the construction site.

1.2 METHODOLOGY

- A. Site of each construction is less than 1 acre but erosion control measures shall apply, although ADEQ Documentation is not required.
- B. Arkansas Department of Environmental Quality (ADEQ) Requirements to be Followed:
 - 1. Use best management practices to reduce run-off.
 - 2. Inspect SW controls bi-monthly.

1.3 SWPPP PLAN

- A. Storm Water Pollution Prevention Plan showing location of silt fences and other storm water run-off controls is included in the drawings, BUT a SWPP Plan was not developed, not required.

1.4 FORMS

- A. "Construction Site Notice" NPDES General Permit No. ARR150000 for sites with automatic coverage is to be followed, but is not required to be completed and sent to ADEQ

PART 2 - PRODUCTS: Use Products as noted on the Drawings (and additionally identified below.)

2.1 MATERIALS

- A. Mulch Cover: Straw from threshed rice, oats, wheat, barley or rye; of wood excelsior; or from hay obtained from various legumes or grasses, such as lespedeza, clover, vetch, soybeans, Bermuda, carpet sedge, Bahia, fescue or other legumes or grasses, or a combination thereof. Mulch shall be dry and reasonably free of Johnson grass or other noxious weeds, and shall not be excessively brittle or in an advanced state of decomposition. All materials will be inspected and approved prior to use.
- B. Straw Bales: Straw for barrier bales shall consist of rice, oat, barley, wheat or rye straw or of available grasses free of an excessive amount of noxious weeds. Bales shall weight approximately 35 lbs. Straw in advanced state of decomposition will not be acceptable.
- C. Filter Fabric: Typar 3401, Trevira S1115, or approved equal nonwoven polypropylene or polyester fabric.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. Post on-site notice as required.
- B. Follow on ADEQ requirements.

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- C. Ensure that earthwork and final grading in area requiring erosion control have been brought to grade as required by contract documents.
- D. Straw Bale Filter: Tightly bound straw bales embedded at least 4 inches into soil and each bale held in place by 2 stakes driven at least 18 inches into ground. Bales shall tightly abut adjacent bales. Strings shall not touch the ground.
- E. Silt Fence: Fence post spaced no more than 10 feet apart and driven a minimum of 2 feet into ground. Post shall extend minimum of 2 feet above ground. Fasten metal mesh fence with 6 inch or smaller openings to fence posts to reinforce silt fence fabric. Mesh fence to extend 2 feet above grade and 4 inches into grade. Mesh may be omitted if reinforced silt fence fabric is used or in areas of low flow.
- F. Nonvegetative Soil Stabilization: Utilize temporary nonvegetative soil stabilization to provide protection against excessive soil erosion over a short period of time. Required in areas that experience high water flows and high run-off velocities and at disturbed slopes steeper than 2:1.
 - 1. Mulch: Apply at 1.5 to 2.5 tons per acre.
 - 2. Anchor by peg and twine, mulch netting, erosion control, fabric, jute matting or mulch anchoring tool.

END OF SECTION

SECTION 015719 – ENVIRONMENT PROTECTION

PART 1 - GENERAL

1.1 DEFINITIONS

- A. For the purpose of these specifications, environment protection is defined as the preservation of the environment in its preconstruction state to the greatest feasible extent throughout project construction.

1.2 QUALITY CONTROL

- A. The Contractor shall inspect all environment protection operations for compliance with the contract requirements, perform all tests as required, and maintain records of his quality control for all operations, including but not limited to the following: Compliance with all Federal, State and local pollution control regulations.
 - 1. Monitoring and surveillance procedures.
 - 2. Site access, parking and traffic control of equipment.
 - 3. Locations of temporary facilities and support activities.
 - 4. Handling, storage, use and disposal of petroleum products, chemicals, and toxic materials.
 - 5. Solid and liquid waste disposal.
 - 6. Noise control, dust control, and pest control.
 - 7. Disposal of construction materials and other debris.
 - 8. A copy of these records, including all tests performed and corrective actions taken, shall be furnished to the Architect/Owner.

1.3 NOTIFICATION

- A. The Owner/Architect will notify the Contractor in writing of any non-compliance with any applicable Federal, State, or local laws or regulations. The Contractor shall, after receipt of such notice, immediately inform the Architect of proposed corrective action and take such action as may be approved. If the Contractor fails or refuses to comply promptly, the Owner/Architect may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time, or for excess costs or damages by the Contractor. The Architect shall be notified of any spillage of hazardous chemicals in excess of 2 gallons.

1.4 SUBCONTRACTORS

- A. Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

1.5 PROTECTION OF LAND RESOURCES

- A. The Contractor shall confine his construction activities to areas on the site as determined and outline at the Preconstruction Meeting.

1.6 PROTECTION OF WATER RESOURCES

- A. General:
 - 1. The Contractor shall not pollute storm water with fuels, oil, bitumens, calcium chloride, acids, or other harmful materials. The Contractor shall investigate and comply with all applicable Federal, State, County and municipal laws concerning pollution of rivers and streams.
- B. Spillages
 - 1. Special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, and concrete drainage from entering storm water system.

1.7 DISPOSAL OF DEBRIS

- A. All materials resulting from construction operations of such as undercut material, and debris shall be disposed of off-site by the Contractor as per Arkansas Department of Environmental Quality-Solid Waste Division regulatory requirements. The Contractor shall be responsible for compliance with all Federal, State, and local laws and regulations applicable to dispose of these materials. The Contractor shall disclose the disposal site in the pre-construction conference. If private property is selected as disposal site, the property Owner's written consent shall be furnished to the Owner/Architect.
- B. Disposal of petroleum, oil, and lubricants (POL) products, chemicals, or other hazardous or toxic components, may require EPA approval of permits from the state. Where such permits are required, the Contractor shall be responsible for obtaining such permits and shall be responsible for the payment of any fines or penalties for failure to do so.

1.8 DUST CONTROL

- A. The Contractor will be required to maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which would exceed allowable limits of the standards for air pollution.

1.9 NOISE CONTROL

- A. The Contractor will be required to comply with Federal, State and local requirements for noise control of his vehicles and equipment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Products
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product Options.
- E. Product substitution procedures.

1.2 RELATED SECTIONS

- A. Section 002100 – Instruction to Bidders, Article 1.21, Standards of Quality.

1.3 PROJECT DATA

- A. Provide new, never before used, products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.

1.4 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.5 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturer's instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection. When products are stored off-site, they must be inventoried by Architect before payment can be made. Insurance certificates must name the Owner as certificate holder/beneficiary.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and gradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

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- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards: Select an product meeting standards, by any manufacturer.
- B. Products Specified by Naming Several Products or Manufacturers: Select any product and manufacturer named.
- C. Products Specified by Naming Only One Product and Manufacturer: There is no option unless substitution is approved as specified. Products of other manufacturers shall meet minimum performance criteria specified or quality of product description.

1.7 PRODUCT SUBSTITUTION PROCEDURES

- A. Architect/Engineer will consider requests for Substitutions only within 15 days after date of Owner-Contractor Agreement.
- B. Substitutions may be considered when a product becomes unbailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor;
 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 2. Will provide the same warranty for the Substitution as for the specified product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied or Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit Show Drawings, Product Data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 3. The Architect will notify Contractor in writing of decision to accept or reject request.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Starting of systems.
- C. Demonstration and Instructions
- D. Testing, Adjusting and Balancing
- E. Protecting installed construction.

1.2 RELATED SECTIONS

- A. Section 017400 – Cleaning
- B. Section 017800 – Closeout Submittals
- C. Section 017839 – Project Record Documents

1.3 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's review.
- B. Provide submittals to Architect that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer seven (7) days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractors' personnel in accordance with manufacturers' instructions
- G. Submit a written report in accordance with Section 013000 That equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two (2) weeks prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season.
- C. Utilize Operation and Maintenance Manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time at the site.

1.6 TESTING, ADJUSTING AND BALANCING

- A. Contractor will appoint and employ services of an independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services.
- B. See mechanical specifications for specific requirements.
- C. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing materials manufacturer.
- F. Prohibit traffic from landscaped areas.

1.8 USE OF BUILDING

- A. Contractor shall allow the Owner use of the substantially completed building for placement and installation of equipment. Such use of the structure shall not signify that the Owner accepts the building.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017400 - CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the construction period, maintain the building and site in a standard of cleanliness as described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

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

2.2 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

- A. General
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
 - 2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 - 3. At least twice each month, 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 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 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. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.1-1-1 above.
 - 3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Daily, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Daily, and more often if necessary, sweep interior spaces clean.
 - a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
 - a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material.

3.2 FINAL CLEANING

- A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.
- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.
- C. Site:
 1. Unless otherwise specifically directed by the Architect, broom clean paved areas on the site and public paved areas adjacent to the site.
 2. Completely remove resultant debris.
- D. Structures:
 1. Exterior:
 - a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
 2. Interior:
 - a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
 3. Glass: Clean inside and outside.
 4. **POLISHED/WAXED SURFACES (SUCH AS VCT FLOORING): TO SURFACES REQUIRING ROUTINE APPLICATION OF BUFFED POLISH/WAX, APPLY THE POLISH/WAX IN THE QUANTITIES/COATS AS RECOMMENDED BY THE MANUFACTURER OF THE MATERIAL BEING POLISHED.**
- E. Schedule final cleaning as approved by the Architect to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY

- A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be determined by the Architect in accordance with the General Conditions of the Contract.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Required documents for final payment.

1.2 RELATED SECTIONS

- A. Section 017800 – Closeout Submittals
- B. Section 006000 – Project Forms
- C. Section 017839 – Project Record Documents

1.3 REQUIRED DOCUMENTS FOR FINAL PAYMENT

- A. Contractor to notify the Architect in writing that all punch list items are complete and the project is ready for acceptance by the Owner.
- B. "Substantial Completion" will be issued by the Architect, at which time the contractor shall submit the "Final Pay Request".

1.4 DOCUMENTS TO BE SUBMITTED WITH FINAL PAY REQUEST

- A. Consent of Surety to Final Payment
- B. Affidavit of Payment of Debts and Claims
- C. Affidavit of Release of Liens.
- D. Required Operation and Maintenance Data.
- E. Required Warranties.
- F. Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Operation and Maintenance Data
- B. Manual for Materials and Finishes
- C. Manual for Equipment and Systems
- D. Product Warranties and Product Bonds

1.2 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 inch pages, D size ring binders with durable plastic covers, and electronically as a CD (PDF info).
- B. Prepare binder cover and CD cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project.
- C. Internally subdivide the binder (and CD) contents with permanent page dividers, logically organized as described below; with tab tilting clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages. Drawings shall also be as a pdf on the CD.
- E. Contents: Prepare a Table of Contents for each volume (or CD) with each product or system description identified, typed on white paper, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3:
 - a. Shop drawings and product date.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
 - 4. Submit one set of the binders and three (3) CD's, within 10 days after final inspection.
 - 5. Final pay request will not be processed until all closeout documents are received.

1.3 MANUAL FOR MATERIALS AND FINISHES

- A. Submit one "paper" copy and one CD (PDF info) copy of manual within 10 days after final inspection. Manual and CD to be as described in 1.02, A-E above.

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- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations.
- D. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- E. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- F. Additional Requirements: As specified in individual product specification sections.
- G. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.
- H. Final pay request will not be processed until all closeout documents are received.

1.4 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit one "paper" copy and one CD (PDF info) copy of manual within 10 days after final inspection. Manual and CD to be as described in 1.02, A-E above.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Each Item of Equipment and Each System: Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- D. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications.
- E. Include color coded wiring diagrams as installed.
- F. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Including regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- G. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting balancing, and checking instructions.
- H. Provide servicing and lubrication schedule, and list of lubricants required.
- I. Include manufacturer's printed operation and maintenance instructions.
- J. Include sequence of operation by controls manufacturer.
- K. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- L. Provide control diagrams by controls manufacturer as installed.
- M. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

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- N. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- O. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- P. Include test and balancing reports.
- Q. Additional Requirements: As specified in individual product specification sections.
- R. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- S. Final pay request will not be processed until all closeout documents are received.

1.5 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- B. Execute and assemble transferrable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify that documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:
 - 1. For equipment of component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.

1.6 NUMBER OF MANUALS

- A. Manuals required in 1.2, 1.3, 1.4 and 1.5 may be combined into one or two manuals if volume of data will permit use of D size ring binders. All information as required by 1.2, 1.3, 1.4 and 1.5 shall be submitted as a CD (3 copies).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included:
 - 1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.2 below.
 - 2.
 - 3. Upon completion of the Work, transfer the recorded changes to a set of Record Documents, as described in Article 3.2 below.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Other requirements affecting Project Record documents may appear in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Architect.
- B. Accuracy of records:
 - 1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.
- C. Make entries within 24 hours after receipt of information that the change has occurred.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. The Architect's approval of the current status of Project Record Documents may be a prerequisite to the Architect's approval of requests for progress payment and request for final payment under the Contract.
- C. Prior to submitting each request for progress payment, secure the Architect's approval of the current status of the Project Record Documents.
- D. Prior to submitting request for final payment, submit the final Project Record Documents to the Architect and secure his approval.

1.4 PROJECT RECORD DOCUMENTS HANDLING

- A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of all recorded data to the final Project Record Documents.
- B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect's approval.
 - 1. Such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials.
 - 2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS

2.1 RECORD DOCUMENTS

- A. Job set: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect at no charge to the Contractor one complete set of all Documents comprising the Contract.
- B. Final Record Documents ("As-Built"): At a time nearing the completion of the Work, secure from the Architect at no charge to the Contractor one complete set of reproducibles of all Drawings in the Contract.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET

- A. Immediately upon receipt of the job set described in Paragraph 2.1-A above, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET."
- B. Preservation:
 - 1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.
 - 2. Do not use the job set for any purpose except entry of new data and for review by the Architect, until start of transfer of data to final Project Record Documents.
 - 3. Maintain the job set at the site of Work as that site is designated by the Architect.
- C. Making entries on Drawings:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
 - 2. Date all entries.
 - 3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
 - 4. In the event of overlapping changes, use different colors for the overlapping changes.
- D. Make entries in the pertinent other Documents as approved by the Architect.
- E. Conversion of schematic layouts:
 - 1. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items, is shown schematically and is not intended to portray precise physical layout.
 - a. Final physical arrangement is determined by the Contractor, subject to the Architect's approval.
 - b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the Drawings.
 - 2. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline of each run of items such as are described in subparagraph 3.1-E-1 above.
 - a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
 - b. Show, by symbol or note, the vertical location of the item ("under slab," "in ceiling plenum," "exposed," and the like).
 - c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
 - 3. The Architect may waive the requirements for conversion of schematic layouts where, in the Architect's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.
- F. If it is determined at any time during the construction that the Contractor has failed or is neglecting to record as-built conditions, a reduction of the pay request may be made by the Owner and /or Architect until the condition is corrected.

3.2 FINAL PROJECT RECORD DOCUMENTS ("AS-BUILTS")

- A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
- B. Approval of recorded data prior to transfer:
 - 1. Following receipt of the reproducibles described in Paragraph 2.1-B above, and prior to start of transfer of recorded data thereto, secure the Architect's approval of all recorded data.
 - 2. Make required revisions.
- C. Transfer of data to Drawings:
 - 1. Carefully transfer change data shown on the job set of Record Drawings to the corresponding reproducibles, coordinating the changes as required.
 - 2. Clearly indicate at each affected detail and other Drawing a full description of the changes made during construction, and the actual location of items described in subparagraph 3.1-E-1 above.
 - 3. Call attention to each entry by drawing a "cloud" around the area or areas affected.
 - 4. Make changes neatly, consistently, and with the proper media to assure longevity and clear reproduction.
- D. Transfer of data to other Documents:
 - 1. If the Documents other than Drawings have been kept clean during progress of the Work, and if entries thereon have been orderly to the approval of the Architect, the job set of those Documents other than Drawings will be accepted final Record Documents.
 - 2. If any such Document is not so approved by the Architect, secure a new copy of that Document from the Architect at the Architect's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the approval of the Architect.
- E. Review and submittal:
 - 1. Submit the completed set of Project Record Documents to the Architect as described in Paragraph 1.3-D above.
 - 2. Participate in review meetings as required.
 - 3. Make required changes and promptly deliver the final Project Record Documents to the Architect.
 - 4. **"AS-BUILTS" SHALL BE SUBMITTED TO THE ARCHITECT AS BOTH A PAPER COPY AND ELECTRONIC COPY (CD WITH DRAWINGS STORED AS PDF).**

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE

- A. The Contractor has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

3.4 LIQUIDATED DAMAGES

- A. **Failure to submit Owner and/or Architect approved Final Project Record Documents, no later than 30 days after Date of Substantial Completion, shall result in \$1,000.00 Liquidated Damages for the Contractor, not submitting the Documents within the stated time frame. (See Paragraph 9.11 of Supplementary Conditions)**

END OF SECTION

SECTION 024100 - DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Removal of existing construction as shown on the Drawings.

1.2 REFERENCE STANDARDS

- A. 29 CFR 1926 – U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCOPE

- A. Remove portions of existing site appurtenances as shown on the drawings.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. The general contractor shall familiarize himself with the site and be aware of all site/building appurtenances to be removed, and by submitting a bid assumes responsibility for all demolition work to be performed.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
- C. Care is to be taken not to damage existing materials to remain. Any damage to existing materials is to be the responsibility of the general contractor.

3.3 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not disrupt public utilities without permit from authority having jurisdiction.
- C. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to the Owner.

3.4 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.

END OF SECTION

SECTION 02 41 10 - UTILITY DEMOLITION/RELOCATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section covers work required for the demolition and/or relocation of underground and above ground utilities and associated structures. All work is to be coordinated with the appropriate local utility company, and includes but is not limited to:

STORM DRAINAGE & SANITARY SEWER

WATER

GAS

ELECTRIC

ARKANSAS "ONE CALL" FOR UNDERGROUND UTILITY LOCATIONS 1-800-482-8998

TELEVISION - CABLE

TELEPHONE

- B. **ANY AND ALL FEES OR CHARGES ASSOCIATED WITH ANY UTILITY DEMOLITION OR RELOCATION SHALL BE PAID FOR BY THE CONTRACTOR. THE CONTRACTOR IS TO INCLUDE ANY AND ALL FEES (TEMPORARY AND PERMANENT) IN HIS BASE BID AND IS TO THOROUGHLY DISCUSS ALL UTILITY DEMOLITION AND/OR RELOCATIONS WITH THE APPROPRIATE PUBLIC AND/OR PRIVATE UTILITY COMPANY PRIOR TO BIDDING.**

1.2 PROTECTION

- A. Protection of Existing Improvements
1. Protection shall be provided to prevent damage to existing improvements indicated to remain in place on the Owner's property and adjoining properties.
 2. Damaged existing improvements shall be restored to their original condition, as acceptable to parties having jurisdiction.
 3. Land areas outside the limits of demolition performed under this contract shall be preserved in their present condition. The Contractor shall confine his demolition activities to areas defined for work on the drawings.
- B. Protection of Existing Utilities
1. The Contractor shall verify all existing utility locations either shown or not shown on the drawings.
 2. The Contractor shall immediately notify the Owner and applicable utility company of any damages to existing utilities.
 3. Repairs to damaged utilities shall be made in accordance with the requirements of the Owner and applicable utility company at no extra cost to the Owner.
 4. The Contractor shall coordinate with the Owner and the applicable utility company for shutoff of or connection to active utilities. Existing utility services shall not be interrupted except as authorized in writing by the Owner.
- C. Protection of Open Excavations: Barricades or other type protectors shall be provided in accordance with current OSHA regulations.

1.3 JOB CONDITIONS

- A. Traffic
1. Demolition operations and the removal of debris shall be conducted in a manner that will ensure minimum interference with roads, driveways, walks and other adjacent occupied or used facilities.
 2. Roads, driveways, walks and other adjacent occupied or used facilities shall not be closed or obstructed without written permission from the Owner of the adjacent facilities.
- B. Use of explosives shall not be permitted.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 UNDERGROUND UTILITY DEMOLITION/RELOCATION

- A. Underground utility demolition/relocation shall include removal/relocation of electric, telephone, television, gas, water, sanitary sewer, storm sewer lines and appurtenances as shown on the Drawings.
- B. Underground utilities to be demolished and/or relocated are shown on the drawings.
- C. Excavations for removal of underground utilities shall be backfilled in accordance with the following:
 - 1. Section 31 20 00 - Earth Moving
 - 2. Section 31 23 33 - Excavation, Trenching and Backfilling

3.3 ABOVE GROUND UTILITY DEMOLITION/RELOCATION

- A. Above ground utility demolition/relocation shall include the removal/relocation of electric, telephone, television lines and appurtenances as shown on the Drawings.
- B. Above ground utilities to be demolished and/or relocated are shown on the Drawings.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. The following shall become the property of the Contractor and shall be disposed of by the Contractor off the site:
 - 1. Items which are not reused.

3.5 CLEANUP

- A. On completion of demolition and after removal of all debris, site shall be left in a clean condition satisfactory to the Owner.
- B. Cleanup shall include off-site disposal of all items and materials not required to be salvaged as well as all debris and rubbish resulting from demolition operations.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A Work included: Provide cast-in-place concrete where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections, in Division 1 of these Specifications.
- C Performing all concrete testing as stated in this Section.

1.2 QUALITY ASSURANCE

- A Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B Comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified:
 - 1. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."
 - 2. ACI 315 "Details and Detailing of Concrete Reinforcement."
 - 3. ACI 318 "Building Code Requirements for Reinforced Concrete."
 - 4. CRSI "Manual of Standard Practice."
 - 5. AWS D1.4 "Standard Welding Code - Reinforcing Steel."
- C Employ at contractor's expense, testing laboratory to perform material evaluation tests.

1.3 SUBMITTALS: See Section 013400

- A Submit "electronic" reinforcing steel shop drawings. Shop drawings shall show all fabrication dimensions and locations for placing of reinforcement and accessories. Drawings will be returned to the Construction Manager after review by the Architect. After the drawings have been corrected in accordance with the review comments, resubmit a file copy to the Architect. Do not fabricate reinforcement until drawings have been reviewed and corrected. Bar marks used on the first submission must be used on subsequent submissions except that the marks of revised bars may be changed.
- B Submit "electronic" product data for all items indicated by the letter (S) in the following articles. "Electronic" information and data will be retained by the Architect. Do not install work in which these products are used until data has been reviewed and found to be acceptable.
- C Submit "electronic" concrete mix design information as specified hereinafter. Do not place concrete until this data has been submitted and reviewed by the Architect / Engineer.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A Forms for surfaces which will not be exposed to view shall be metal, lumber, or plywood of sufficient strength and stiffness to produce the required concrete configurations.

- B Form ties - factory fabricated rod type designed to snap off at least 3/4" inside of the wall surface.
- C Form coating - commercial formulation that will prevent absorption of moisture, will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent curing or treatment of concrete surfaces.
- D Fiberboard forms - Savway Carton Forms, Inc., Savway Carton Forms.

2.2 REINFORCEMENT MATERIALS

- A Reinforcing bars - ASTM A 615, Grade 60 including Supplementary Requirements S1.
- B Wire - ASTM A82
- C Bar supports - wire bar type conforming to CRSI Manual of Standard Practice recommendations. Use bar supports with sand plates for reinforcement in slabs on grade or drainage fill. Legs of other bar supports shall be stainless steel or plastic protected.

2.3 CONCRETE MATERIALS: (S) DENOTES SUBMITTAL INFORMATION REQUIRED

- A Portland cement - ASTM C150, Type I.
- B Fine aggregate - ASTM C33.
- C Course aggregate - ASTM C33 with #467 gradation for 1-1/2" maximum size aggregate.
- D Water - fresh, clean and drinkable.
- E Air-entraining admixture (S) - ASTM C260.
- F Water-reducing admixture (S) - ASTM C494, Type A.
- G Water-reducing, retarding admixture (S) - ASTM C494, Type D.
- H High-range water-reducing admixture (S) - ASTM C494, Type F.
- I High-range water reducing and retarding admixture (S) - ASTM C494, Type G.
- J Fly ash - ASTM C618, Class C. Class F fly ash is NOT PERMITTED.
- K Storage and handling of concrete materials shall conform to the recommendations of ACI 304.

2.4 ACCESSORY MATERIALS: (S) DENOTES SUBMITTAL INFORMATION REQUIRED. Listed manufacturer and project, or approved substitutions.

- A Bonding agent (S) - Larsen Products Company Weld-Crete.
- B Bonding admixture (S) - Larsen Products Company Acrylic Admix - 101.
- C Liquid curing compound (S) - ASTM C309, Type I, Class A of type that will not inhibit bonding of floor covering, paint or other applied finishes.
- D Moisture-retaining cover (S) - waterproof paper conforming to ASTM C171.

- E Vapor barrier (S) - Stego Wrap, 15 mil vapor barrier, by Stego Industries, 1-877-464-7834 conforming to ASTM E 1745 Class "A" (Plastics) or W.R. Meadows Premoulded Membrane with plasmatic core, or zero-perm by Alumiseal. Provide seam tape, mastic and pipe boots for full system installation.
- F Metal joint form (S) - Heckmann Building Product, Inc., No. 95, 20 gauge tongue and groove joints.
- G Expansion joint filler (S) - W. R. Meadows, Inc. Sealtight Fiber Expansion Joint Filler. (Thickness and height as shown on the drawings.)
- H Expansion joint cap (S) - Greenstreak Plastic Products No. 941 Removable Top Expansion Joint Cap.
- I Joint sealant (S) - Lion Oil Company Lion D200 Elastomeric Sealant.
- J Expansion anchor (S) - Hilti Fastening Systems Kwik-Bolt.
- K Drainage Fill (S) - ASTM C33, No. 67 Gradation.
- L Concrete Sealer(s) - Master Kure HD 300 WB, 3 coats for a polished sheen at areas as noted "sealed concrete", or similar note, on the Drawings. Refer to 3.11, F for additional information.
- M Expansion Joint Cover(s) - Construction Specialties RFA - 200.

PART 3 - EXECUTION

3.1 FORMWORK

- A Use earth cuts to form vertical surfaces of foundation piers. Elsewhere use forms, wherever necessary, to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances.
- B The design and engineering of formwork shall be the responsibility of the Contractor.
- C Forms shall be accurately built to provide smooth surfaces and the required dimensions, and they shall be sufficiently tight to prevent leakage. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- D Install 3/4" chamfer strips in external formed corners which will be exposed to view upon completion of construction.
- E Camber the formwork, as necessary, to compensate for deflections in the formwork prior to hardening of the concrete. Provide positive means of adjustment, such as wedges or jacks, for shores and struts so that settlement can be taken up during placing operations. Brace forms against lateral deflections.
- F Provide temporary openings at bases of wall forms and other points where necessary to facilitate cleaning and observation immediately before concrete is placed.
- G At construction joints overlap form material and hold securely against the hardened concrete to prevent offsets or leakage and to maintain a true surface.
- H Build into forms the required inserts, pipe sleeves, bolts and other equipment whether specified under this Section or other Sections of the Specifications.

- I Before placing concrete, clean all surfaces of forms and embedded materials of any mortar from previous concreting and of all other foreign material.
- J Before placing reinforcing steel or concrete, apply form coating to form surfaces in order to prevent absorption of moisture and to prevent bond with the concrete.
- K Construct formwork so that concrete surfaces will conform to the following tolerances:
 - 1. Variations from plumb in lines and surfaces of pedestals, walls, and arrises, 1/4" in any 10' length, but not more than 1".
 - 2. Variations from level or grade in slab soffits, and in arrises, 1/4" in any 10' of length; 3/8" in any 20' of length; and 3/4" maximum for entire length.
 - 3. Variations of distance between walls and beams, 1/4" per 10' of distance, but not more than 1" total variation.
 - 4. Variation from position of linear building lines from established position in plans, not more than 1".
 - 5. Variation in sizes and locations of sleeves, floor openings, and wall openings, minus 1/4" and plus 1/2".
 - 6. Variation in cross-sectional dimensions of pedestals and beams and thickness of slabs and walls, minus 1/4" and plus 1/2".
 - 7. Variation in footing plan dimensions, minus 1/2" and plus 2"; misplacement or eccentricity, 2% of the footing width in direction of misplacement but not more than 2"; thickness reduction, minus 5% of indicated thickness.
 - 8. Variation in steps; in a flight of stairs, 1/8" for rise and 1/4" for treads; in consecutive steps, 1/16" for rise and 1/8" for treads.

3.2 REMOVAL OF FORMS

- A Formwork for walls, and similar vertical surfaces may be removed as soon as the concrete has hardened enough that damage will not result from removal operations.
- B Formwork for slabs, and other surfaces which support the weight of the concrete shall be left in place until the concrete strength has reached its specified 28 day compressive strength.
- C To determine concrete strength for form removal purposes test cylinders in addition to those required for determining concrete acceptability may be made, cured under the same conditions as concrete in the structure, and tested at the appropriate time. Otherwise, concrete in the structure may be considered to have attained the same 28 day compressive strength as laboratory cured cylinders tested for concrete acceptability when it has been cured as specified for a period of 28 days, not necessarily consecutive, during which the temperature of air in contact with concrete surfaces is above 50 degrees F.

3.3 REINFORCEMENT

- A Detail, fabricate and place reinforcement in accordance with ACI 315, ACI 318 and requirements of the Drawings. Shop drawings used in fabricating and placing reinforcement shall have been reviewed by the Architect and corrected in accordance with review comments.
- B Reinforcement shall be accurately placed in the positions shown and secured against displacement by construction loads and the placing of concrete. Reinforcement for foundation beams shall be supported by concrete bricks. Other reinforcements shall be supported by metal bar supports and spacers located and installed as recommended by the CRSI Manual of Standard Practice.

- C At the time concrete is placed reinforcement shall be free from mud, oil, or other coatings that reduce or destroy bond. Reinforcement with rust, mill scale or a combination of both will be acceptable without cleaning or brushing, provided that the cross sectional area and height of deformations have not been reduced.
- D Welding of reinforcing bars will not be permitted.
- E Heating of reinforcing bars will not be permitted.
- F Do not bend reinforcement partially embedded in concrete.
- G Fabricating tolerances for reinforcement shall be accordance with ACI 315.
- H Reinforcing bars shall be placed to the following tolerances:
Clear distance to formed surfaces: $\pm 1/4"$.
Spacing: $-1/4"$ and $+1/2"$ between beam or pedestal, bars $\pm 1"$ between ties, stirrups, wall bars and slab bars.
Height of top bars in slabs and beams: $\pm 1/4"$ for members 8" and less and $\pm 1/2"$ for members more than 8".
Longitudinal location of ends of bars: $\pm 2"$ except at discontinuous ends of members where tolerance shall be $\pm 1/2"$.

3.4 JOINTS AND EMBEDDED ITEMS

- A Construction joints not shown on the Drawings shall be made and located to least impair the strength of the structure. Locations shall be approved by the Architect; however, in general vertical joints shall be located near the middle of the spans of slabs and beams. Horizontal joints in walls shall be at the underside of slabs, and at the tops of foundation beams or floor slabs. Joints shall be perpendicular to the main reinforcement.
- B Unless shown otherwise continue reinforcement across joints and provide keyways as shown on the Drawings.
- C The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed prior to placing adjoining concrete.
- D Joints in grade slabs, walks and concrete pavement shall be hand tooled and shall be located and made as shown on the Drawings. If saw-cut joints are required or permitted cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregate from being dislodged by the saw, and shall be completed before shrinkage stresses become sufficient to produce cracking. If saw-cut joints abut vertical surfaces already in place when the slab is installed, the length of the joint which is inaccessible to the saw shall be grooved while the concrete is still plastic. The groove shall be made with a removable hardboard strip of same width and depth as saw-cut.
- E Locate and install expansion joints as shown on the Drawings. Install expansion joint cap above joint filler. After concrete has hardened remove top of cap and install joint sealant in accordance with the manufacturer's recommendations.
- F Install all sleeves, inserts, anchors, and other embedded items prior to placing concrete, position them accurately and support them against displacement.

3.5 PROPORTIONING AND DESIGN OF CONCRETE MIXES

- A Select proportions of concrete ingredients in accordance with the requirements of ACI 318 to provide the specified properties and to produce workability and consistency that will permit concrete to be worked readily into the forms and around reinforcement under conditions of placement to be employed, without excessive segregation or bleeding.
- B Submit written reports of mix designs, determined in accordance with Section 033000, Subparagraph 3.5.A for each class of concrete. However, in any case do not begin production of concrete until mix design has been reviewed by the Architect.
- C 28 day concrete compressive strength shall be as shown on the Drawings. (If not shown it shall be 3,500 PSI.)
- D Proportion and produce concrete to have a slump of 4" with a tolerance of -1" and +1/2". Concrete must produce the required compressive strength when the slump is at the upper limit of the permitted tolerance.
- E Fly ash may be used as a partial replacement for portland cement in the mixes. The weight of fly ash in a mix shall not exceed 20% of the weight of portland cement in the mix.
- F Concrete which will be exposed to the weather upon completion, shall be air-entrained. Other concrete may be air-entrained. Air content, by volume, shall be between 4 and 7 percent.
- G When the mean daily temperature is below 40 degrees F or when freezing temperatures are forecast within 24 hours after placement all concrete shall be air-entrained.
- H When the air temperature during placing operations is greater than 90 degrees F, all concrete shall contain a water-reducing, retarding admixture.
- I When the air temperature during placing operations is less than 90 degrees F, concrete may contain a water-reducing admixture.
- J High-range water-reducing admixture shall be used in concrete for all slabs. This admixture shall be added at the job site to concrete with a 4" slump, as required to produce concrete with a slump between 7" and 8-1/2". When the air temperature during placing operations is greater than 90 degrees F, high-range water-reducing and retarding admixture shall be used for this work.
- K The use of admixtures or materials not specified will not be permitted. Admixtures which are required or permitted shall be used in accordance with the manufacturer's directions.

3.6 PRODUCTION OF CONCRETE

- A All concrete shall be ready-mixed and shall be batched, mixed and transported in accordance with ASTM C94, except as specified otherwise herein.
- B In cold weather the minimum temperature of the concrete when delivered shall be 50 degrees F for sections with least dimension 12" or greater and 55 degrees F for sections with least dimension less than 12". However, cement shall not be mixed with water or with mixtures of water and aggregate having a temperature greater than 100 degrees F. When materials must be heated to produce the required minimum concrete temperatures, heating provided must be such that concrete temperatures are not greater than 10 degrees above the required minimum temperatures.

- C In hot weather if low slump, flash set or cold joints are encountered concrete ingredients shall be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing shall be substituted for all or part of the mixing water. When air temperature is above 90 degrees F mixing and delivery time shall not exceed 60 minutes.
- D Do not add water to the mix at the job except under conditions specifically permitted by the Architect.

3.7 CONCRETE PLACEMENT

- A THE ARCHITECT SHALL BE NOTIFIED AT LEAST 24 HOURS IN ADVANCE OF ALL PLACING OPERATIONS.**
- B INSTALL DRAINAGE FILL, 4" MINIMUM DEPTH, OVER ALL PREPARED SUBGRADES TO RECEIVE BUILDING SLABS AND THEN INSTALL ONE PLY OF VAPOR BARRIER OVER ALL DRAINAGE FILL WHICH WILL RECEIVE GRADE SLABS, LAPPING JOINTS 6", TAPE ALL JOINTS AND PENETRATIONS. INSTALL SCREEDS IN SUCH A MANNER THAT VAPOR BARRIER WILL NOT BE PUNCTURED.**
- INSTALL VAPOR BARRIER IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND ASTM E 1643-98.**
- C SEE SECTION 096700 - POLYMER FLOOR SYSTEM FOR SUBFLOOR REQUESTS AT FLOORS RECEIVING TROWELED FLOOR FINISH SYSTEM.
- D When concrete is placed, formwork shall have been completed; snow, ice, water, debris and other foreign materials shall have been removed; reinforcement shall have been secured in place; embedded items shall have been positioned; and the entire preparation shall have been inspected by the Architect. Sprinkle subgrade as required to eliminate suction. Do not place concrete on frozen or muddy ground.
- E Chutes, if used, shall be metal or metal lined and shall have a slope between 1 vertical to 2 horizontal and 1 vertical to 3 horizontal.
- F Pumping equipment, if used, shall have adequate pumping capacity. The loss of slump in pumping equipment shall not exceed 2". Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.
- G Deposit concrete continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. In any case the thickness of placement layers shall not exceed 2 feet. Placement shall be at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited.
- H Do not begin placement of supported elements until concrete previously placed in walls is no longer plastic and has been in place at least 2 hours.
- I Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation. Deposit concrete in foundation piers through a hopper or other means that will permit concrete to drop naturally without striking forms, or sides of pier excavations.
- J Consolidate all concrete by mechanical vibration, supplemented by spading, tamping and rodding to secure a dense, homogeneous mass, thoroughly worked around reinforcement and embedded fixtures, and into corners of forms.

- K. Vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. They shall be operated by workmen experienced in their proper use.
- L. Insert and withdraw vibrators at points approximately 18" apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. Where concrete is placed in layers, vibrators shall be inserted through the layer being placed and into the layer below.
- M. A spare vibrator shall be kept on the job during all placing operation.

3.8 BONDING

- A Before depositing fresh concrete against hardened concrete, remove laitance and inferior surface concrete, clean surface of the hardened concrete, and clean forms and adjoining reinforcement of mortar and loose material.
- B Immediately prior to placing of fresh concrete dampen, but do not saturate, the hardened concrete of all joints between fresh and hardened concrete, except where joints are required to be coated with bond-breaker. Remove any standing water from horizontal joint surfaces.

3.9 REPAIR OF SURFACE DEFECTS

- A Defects which, in the opinion of the Architect, cannot be satisfactorily repaired by the provisions of this paragraph shall be repaired by the provisions of this paragraph shall be repaired as directed by the Architect or, if the Architect determines that repairs cannot be satisfactorily made by any method, the work shall be removed and replaced as specified by Section 03300, Subparagraph 3.14.H.
- B Repair other surface defects, including tie holes, immediately after form removal.
- C Remove all honeycombed and other defective material down to sound concrete. Make edges of cuts perpendicular to the concrete surfaces. Thoroughly clean and coat in the area to be patched with bonding agent applied in accordance with the manufacturer's recommendations. Install patching mortar after bonding agent has dried.
- D Patching mortar shall be 1 part cement to 2-1/2 parts sand by damp loose volume with the minimum quantity of mixing water required for handling and placing. Add bonding admixture in accordance with the manufacturer's directions. If surface will be exposed to view blend white portland cement with gray portland cement to produce a color matching the color of the surrounding concrete, as determined by a trial patch installed in an inconspicuous location. Thoroughly consolidate mortar into place and strike off slightly higher than the surrounding surface. Leave undisturbed for approximately one hour, then finish to match the surrounding surface. Keep the patched surface damp for seven days.
- E Cut form ties back at least 3/4". Clean and thoroughly dampen tie holes, then fill solid with patching mortar.
- F Repair defects in unformed surfaces as directed by the Architect.

3.10 FINISHING OF FORMED SURFACES

- A Repair defects of surfaces which will not be exposed to view in accordance with 3.09, then remove fins and other projections. No further finish is required for these surfaces.

- B Repair defects of surfaces which will be exposed to view in accordance with 3.09, remove fins and other projections, then provide grout cleaned finish as follows:
1. Combine one part cement to 1-1/2" parts fine and by volume and mix with water and bonding admixture to consistency of thick paint. Add bonding admixture to water in accordance with the manufacturer's directions. Blend white and gray portland cements to produce a color matching the color of the surrounding concrete. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, then apply grout. Immediately after applying the grout, scrub the surface with a cork float or stone to coat the surface and fill small holes. While grout is still plastic, remove excess grout by scraping and rubbing with clean burlap, a rubber float or other means to produce a uniformly textured surface. Keep surface damp for at least 36 hours after rubbing. Complete any area in the same day it is started, with units of area being natural breaks in the finished surfaces. A trial patch of the finish shall be made to show color match and texture of finish. Trial patch shall be approved by the Architect before proceeding.

3.11 FINISHING OF UNFORMED SURFACES

- A After concrete has been placed, consolidated, struck off and leveled do not work further until ready for floating. When the water sheen has disappeared and the concrete has stiffened sufficiently to permit floating operations, float surface as required to compact it, remove surface imperfections and level the surface to a tolerance of 1/4" in 10' when tested with a 10' long straight edge. After leveling refloat the surface to a uniform sandy texture.
- B Trowel finish interior floor slabs after float-finishing. Trowel as required to produce a smooth uniform surface, free of trowel marks and other defects and plane to a tolerance of 1/4" in 10' when tested with a 10' straightedge. Grind surface imperfections which would telegraph through applied floor coverings.
- C If Terrazzo floors are noted: Finish interior slabs which will receive terrazzo by drawing a broom across the surface immediately after float-finishing to produce a textured surface.
- D Finish all exterior slabs, including walks and pavement by drawing a broom across the surface immediately after trowel-finishing, to produce a uniformly textured surface. Broom line shall be parallel to direction of slope.
- E Tool exposed top edges of slabs with a round edging tool.
- F **Finish interior slabs noted as "Sealed Concrete" on the Drawings with concrete sealer Master Kure HD 300 WB as manufactured by Master Builders Solution, or equal where exposed concrete is the final finish. Apply 3 coats for a polished sheen. Follow all manufacturer's installation instructions.**

3.12 CURING AND PROTECTION

- A Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury as specified herein.
- B Immediately after placement operations are complete, provide protection of unformed surfaces from premature drying by one of the following:
1. Cover concrete surfaces with moisture retaining cover lapped 3" at joints and sealed with waterproof tape. Leave cover in place for at least 7 days. Immediately repair any holes or tears using cover material and waterproof tape.
 2. Apply curing compound in accordance with the manufacturer's recommendations. Immediately repair any damage to curing membrane which occurs within 7 days by the application of additional curing compound. Curing compound must be of a type that will not inhibit the bond of applied floor materials.

- C Keep wood forms continuously wet for 7 days unless they are removed earlier. If forms are removed earlier than 7 days apply curing compound as specified for unformed surfaces to provide a 7-day curing period. Curing compound must be of a type that will not inhibit the bond of applied finishes.
- D When the mean daily outdoor temperature is greater than 40 degrees F, concrete surfaces shall be protected from freezing for at least 24 hours after placement. When the mean daily outdoor temperature is less than 40 degrees F, maintain the temperature of the concrete between 50 degrees F and 70 degrees F for 7 days after placement. Make arrangements for protecting concrete in advance of placement operations. Use methods of protection that will maintain the required temperature without injury due to concentration of heat. Do not use combustion heaters during the first 24 hours after placement. After the required protection period, discontinue protective measures in such a way that the change in air temperature does not exceed 5 degrees F in any one hour period.
- E When weather conditions are such that plastic shrinkage cracking tends to appear and cold joints tend to form during placement use windbreaks, shading or fog spraying to prevent rapid drying of the concrete. Make arrangements for such measures in advance of placement operations.
- F Protect the concrete from heavy shock and vibration for not less than 28 days after placement.

3.13 TESTING

- A Make tests of concrete for each 100 cubic yards or fraction thereof of each mix design of concrete placed in any one day.
- B Sampling of concrete, slump tests, determination of air content and making of compressive test cylinders shall be performed in accordance with ASTM C172, C143, C231, and C31, respectively. The Contractor will be responsible for all costs in connection with concrete testing.
- C Make three compressive cylinders for each test, along with determination of slump. Field cure cylinders for 20-24 hours in accordance with ASTM C31; then ship to the laboratory. One cylinder will be tested at 7 days and two cylinders will be tested at 28 days. The average compressive strength of the two cylinders tested at 28 days constitute the test result. Cylinders will be tested in accordance with ASTM C39.

3.14 EVALUATION AND ACCEPTANCE OF CONCRETE WORK

- A Cylinder test results will be evaluated separately for each specified concrete mix design.
- B The strength level of the concrete will be considered satisfactory if the averages of all sets of three consecutive test results equal or exceed the specified strength and no individual test result falls below the specified strength by more than 500 pounds per square inch.
- C If the Contractor wishes to remove soffit forms earlier than 28 days, he may, at his own expense, have additional compressive strength tests made in the same manner as those made for concrete acceptability, except that they shall be field cured for the full curing period as required by ASTM C31.
- D When it appears, the tests will fail to meet specified strength requirements the Contractor shall make such changes in the proportions of concrete for the remainder of the work as are necessary in order to meet the strength requirements. In addition, the Architect may also require additional curing of portions of the concrete already placed.

- E The Architect may also require tests from the hardened concrete in accordance with ASTM C42 when the concrete compressive cylinder tests fail to meet strength requirements. Such tests will be at the Contractor's expense.
- F In the event concrete cylinder tests and tests from the hardened concrete fail to meet strength requirements and structural analysis does not confirm the safety of the structure, the Architect may require load testing of the affected portions of the structure in accordance with Chapter 20 of ACI 318. Such testing will be at the Contractor's expense.
- G If concrete work is judged to be inadequate by the results of tests it shall be reinforced with additional construction if the Architect determines that this can be accomplished without impairing the usefulness of the structure. If structural analysis or the results of tests do not confirm the safety of the structure, and the Architect determines that reinforcing the structure cannot be done without impairing its usefulness, the affected concrete work shall be removed and replaced.
- H Concrete work which fails to meet drawing and specification requirements because of considerations other than concrete quality shall be repaired as directed by the Architect unless he determines that repairs cannot be accomplished satisfactorily, in which case the affected concrete work shall be removed and replaced.
- I Repairs or removal and replacement required because of failure to meet drawing and specification requirements shall be at the Contractor's expense.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide structural steel and accessories as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 033000 - Cast-in-Place Concrete (Reinforcing Steel)
 - 3. Section 055000 - Metal Fabrications
 - 4. Section 131210 - Pre-Engineered Metal Building
- C. **Perform Inspection as described in Article 3.5 of this Section.**

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with the provisions of the following except as otherwise shown or specified:
 - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," including the "Commentary of the AISC Specification."
 - 3. AWS D1.1 "Structural Welding Code - Steel."
 - 4. Research Council on Structural Connections of the Engineering Foundation "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Sufficient technical data to demonstrate compliance with the specified requirements;
 - 2. Complete Shop Drawings showing all members, proposed cuts, connections, camber, holes, and similar data.
 - 3. Two copies of shop drawings are to be submitted, one of which will be returned after review by Architect. After the drawings have been corrected by the Contractor or supplier, six corrected copies shall be submitted. Two copies will be retained by the Architect and if more than four copies are required by the Contractor, subcontractor and material suppliers, a correspondingly greater number of copies shall be submitted. Do not fabricate steel until drawings have been reviewed and corrected.
 - 4. Structural steel shop drawings shall be checked by the fabricator before submission. Each drawing shall bear the name or initials of the detailer and checker. Drawings will not be reviewed until they have been checked.
- C. Furnish two copies each of certificates of welder qualification in accordance with the requirements of AWS D1.1.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

- B. Delivery and storage:
 - 1. Deliver materials to the job site properly marked to identify the location for which they are intended.
 - 2. Use markings corresponding to markings shown on the approved Shop Drawings.
 - 3. Store in a manner to maintain identification and prevent damage, off the ground, using pallets or other supports, and to permit easy access for inspection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Rolled steel plates, shapes and bars: Comply with ASTM A36.
- B. Structural tubing: ASTM A500, Grade B.
- C. Steel pipe: Comply with ASTM A53, Grade B.
- D. Anchor bolts: ASTM A36, or equivalent.
- E. Connection bolts: Comply with ASTM A325, with nuts conforming to ASTM F436.
- F. Welding electrodes: Conform to the requirements of AWS D1.1.
- G. Grout: Master Builders Co., Embeco 636 Grout.
- H. Below grade waterproofing: Sonneborn Building Products Hydrocide Mastic.

2.2 FABRICATION

- A. Fabricate items of structural steel in accordance with AISC specifications.
- B. Splice members only where shown on the Drawings.
- C. Install connection bolts in accordance with requirements shown on the Drawings using bearing type connections.
- D. Where finishing is required, complete the assembly, including welding of units, before start of finishing.
- E. Provide finish surfaces of members exposed in the final structure free from markings, burrs, and other defects.
- F. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
- G. Do not flame cut holes or enlarge holes by burning.

2.3 SHOP PAINTING

- A. **STEEL SURFACES WHICH WILL BE ENCASED WITH SPRAYED ON FIREPROOFING AND SURFACES WHICH ARE TO BE WELDED SHALL BE LEFT UNPAINTED. UNPAINTED STEEL SHALL BE CLEANED OF OIL AND GREASE BY SOLVENT CLEANERS AND CLEANED OF DIRT AND OTHER FOREIGN MATERIALS BY SWEEPING WITH A FIBER BRUSH.**
- B. All other steel surfaces (not in above paragraph) shall be cleaned to meet the requirements of SSPC - SP2 Hand

Tool Cleaning and given a shop coat of the fabricator's standard gray or red primer paint to a dry film thickness not less than 1.5 mils.

- C. Apply 2 coats of primer paint to surfaces which are required to be painted but will be inaccessible after assembly or erection.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 ERECTION

- A. Surveys:
 - 1. Establish permanent benchmarks necessary for accurate erection of structural steel.
 - 2. Check elevations of concrete bearing surfaces, and locations of anchor bolts and similar items before erection work proceeds and report discrepancies to the Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with the Architect.
- B. Erect steel in accordance with AISC Specification and Code of Standard Practice. Do not correct fabrication errors by gas cutting unless specifically permitted by the Architect. Ream holes that must be enlarged to admit bolts.
- C. Temporary shoring and bracing;
 - 1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
 - 2. Provide temporary guy lines to achieve proper alignment of the structure as erection proceeds.
 - 3. Remove temporary connections and members when permanent members are in place and final connections are made.
- D. Connection bolts:
 - 1. Install connection bolts and other connectors required for securing structural steel to adjacent work.
 - 2. Provide templates and other devices as needed for presetting bolts and other anchors to accurate locations.

- E. Setting bases and bearing plates:
1. Clean concrete bearing surfaces free from bond-reducing materials, and then roughen to improve bond to surface.
 2. Clean the bottom surface of base and bearing plates.
 3. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 4. Tighten anchor bolts after supported members have been positioned and plumbed.
 5. Do not remove wedges or shims but, if protruding, cut off flush with edge of the base or bearing plate prior to packing with grout.
 6. Pack grout solidly between bearing surfaces and bases or plates to assure that no voids remain.
 7. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's recommendations as approved by the Architect.
- F. Field assembly:
1. Set structural frames accurately to the lines and elevations indicated.
 2. Align and adjust the members forming part of a complete frame or structure before fastening permanently.
 3. Clean the bearing surfaces and other surfaces which will be in permanent contact before assembly.
 4. Adjust as required to compensate for discrepancies in elevation and alignment.
 5. Level and plumb individual members of the structure within specified AISC tolerances.
 6. Establish required leveling and plumbing measurements on the mean operating temperature of the structure, making allowances for the difference between temperature at time of erection and the mean temperature at which the structure will be when completed and in service.
 7. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to welds.
- G. Gas cutting:
1. Do not use gas cutting torches for correcting fabricating errors in structural framing, except on secondary members where acceptable to the Architect.
 2. When gas cutting is permitted, finish the gas cut section to sheared appearance acceptable to the Architect.

3.4 FIELD PAINTING

- A. **APPLY 2 COATS OF BELOW GRADE WATERPROOFING (ASPHALTIC "PAINT") TO COLUMN BASES AFTER INSTALLATION AND BEFORE THEY ARE ENCASED IN CONCRETE.**
- B. Where "Exposed Structure" is noted on the Drawings as the finished ceiling (and/or walls), the structural steel shall be thoroughly cleaned and painted as per Section 09900 - Paint.

3.5 **INSPECTING: APPLIES TO ALL SECTIONS WITHIN DIVISION 5 - METALS (CONTRACTOR RESPONSIBILITY)**

- A. **A COMPLETE FOUR SIDED INSPECTION OF STEEL AND ITS CONNECTIONS WILL BE MADE OF ALL STRUCTURAL STEEL, STEEL JOISTS AND METAL ROOF DECK.**
- B. **COST OF INSPECTING WILL BE PAID BY THE CONTRACTOR AND IS A PART OF THE BID/PROPOSAL.**
- C. **THE CONTRACTOR'S TESTING COMPANY MUST BE SUBMITTED TO THE ARCHITECT FOR APPROVAL PRIOR TO ANY TESTING. IF, AFTER FABRICATION AND INSPECTION, THE WORK OF THIS SECTION IS FOUND TO BE DEFECTIVE AND TO REQUIRE REINSPECTION, COST OF SUCH REINSPECTION WILL BE PAID BY THE CONTRACTOR.**
- D. **PROVIDE LABOR, EQUIPMENT, AND FACILITIES NEEDED TO MOVE AND HANDLE THE MATERIALS TO**

STRUCTURAL STEEL

BE INSPECTED.

- E. A WRITTEN REPORT OF SUCH INSPECTIONS SHALL BE SUBMITTED TO THE ARCHITECT IMMEDIATELY AFTER INSPECTIONS.**
- F. PROVIDE ACCESS TO WORK AS REQUIRED TO ACCOMPLISH TESTING.**

3.6 WELDING INSPECTION: APPLIES TO ALL SECTIONS IN DIVISION 5 - METALS

- A. UNLESS OTHERWISE SPECIFIED, PERFORM WELDING OF STRUCTURAL STEEL, STEEL JOISTS AND METAL ROOF DECK UNDER OBSERVATION OF A QUALIFIED INSPECTOR FROM A TESTING LABORATORY APPROVED BY THE ARCHITECT.**
- B. INSPECT EVERY LAYER OF WELD FOR QUALITY, PENETRATION, AND CONFORMITY WITH DESIGN REQUIREMENTS.**
- C. Require the welding inspector to submit a signed report to the Architect, verifying that:
 - 1. The welding is adequate and was performed in conformity with the specified requirements; and
 - 2. Adequate methods have been used to determine the quality of the welding.
- D. The welding inspector may use gamma ray, magnaflux, trepanning, or any other aid of visual inspection considered necessary to assure adequacy of welding, or may use ultrasonic testing performed in accordance with pertinent requirements of governmental agencies having jurisdiction.
- E. Cost of welding inspection is Contractor's responsibility and a part of Bid/Proposal.
- F. Provide access to work as required to accomplish testing.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide miscellaneous metal work shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 051200 - Structural Steel
 - 3. Section 131210 - Pre-Engineered Metal Building

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent requirements of the American Welding Society.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product Data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the Work of this Section with the work of adjacent trades.
 - 4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used in the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In fabricating items which will be exposed to view, limit materials to those which are free from surface blemishes, pitting, rolled trade names and roughness.
- B. Comply with the following standards, as pertinent:
 - 1. Steel plates, shapes and bars: ASTM A36;
 - 2. Steel plates to be bent or cold-formed: ASTM A283, grade C;
 - 3. Steel tubing (hot-formed, welded or seamless): ASTM A501.
 - 4. Steel bars and bar-size shapes: ASTM A306, grade 65 or ASTM A36;

5. Cold-finished steel bars: ASTM A108;
6. Cold-rolled carbon steel sheets: ASTM A336;
7. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.
8. Stainless steel sheets: AISI type 302 or 304, 24 gage with number 4 finish.
9. Gray iron castings: ASTM A48, class 10;
10. Malleable iron castings: ASTM A47;
11. Steel pipe: ASTM A53, grade A, schedule 40, black finish unless otherwise noted;
12. Concrete inserts:
 - a. Threaded or wedge type galvanized ferrous castings of malleable iron complying with ASTM A27;
 - b. Provide required bolts, shims, and washers, hot-dip galvanized in accordance with ASTM A153.

2.2 FASTENERS

- A. General:
 1. For exterior use and where built into exterior walls, provide zinc-coated fasteners.
 2. Provide fasteners of type, grade and class required for the particular use.
- B. Comply with the following standards as pertinent:
 1. Bolts and nuts: Provide hexagon-head regular type complying with ASTM A307, grade A;
 2. Lag bolts: Provide square-head type complying with Federal Spec FF-B-561;
 3. Machine screws: Provide cadmium plated steel type complying with Federal Spec FF-S-111;
 4. Washers:
 - a. Plain washers: Comply with Federal Spec FF-W-92, round, carbon steel;
 - b. Lock washers: Comply with Federal Spec FF-W-84, helical spring type carbon steel;
 5. Toggle bolts: Provide type, class and style needed but complying with Federal Spec FF-B-588;
 6. Anchorage devices: Provide expansion shield complying with Federal Spec FF-S-325.

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.4 SHOP PAINT

- A. Primer: Use "10-99 Tnemec Primer", "Rustoleum No. 5769 Primer" or approved equal.
- B. For repair of galvanizing, use a high zinc-dust content paint complying with MIL-P-21035.

2.5 FABRICATION

- A. Except as otherwise shown on the Drawings, use materials of size, thickness and type required to produce reasonable strength and durability in the Work of this Section.
- B. Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed weld smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible.
- C. Prior to shop painting or priming, properly clean metal surfaces as required for the applied finish and for the proposed use of the item.
- D. On surfaces inaccessible after assembly or erection, apply two coats of the specified primer. Change color of second coat to distinguish it from the first.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 COORDINATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the Work of this Section.

3.4 INSTALLATION

- A. General:
 - 1. Set work accurately into position, plumb, level, true and free from rack, and as per any manufacturer instructions.
 - 2. Anchor firmly into position.
 - 3. When field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld and for methods to be used in correcting weld work.
 - 4. Grind exposed welds smooth and touch up shop prime coats.
 - 5. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed connections.
- B. Immediately after erection, clean the field welds, bolted connections and abraded areas of shop priming. Paint the exposed areas with the same material used for shop priming.
- C. Paint all exposed interior and exterior metal as per Section 099000 - Paint.
- D. Install Expansion Control systems at all new -to-existing concrete slab joints/abutments . Coordinate locations with Architect.
- E. Perform Inspections as per Section 051200 - Structural Steel.

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide wood, nails, bolts, screws, framing anchors and other rough hardware, and other items needed, and perform rough carpentry for the construction shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
 - 1. Miscellaneous wood framing and sheathing.
 - 2. Miscellaneous furring for wall finishes.
 - 3. Miscellaneous blocking, cants and curbs for roofing systems, related metal flashings and roof mounted equipment/accessories.
 - 4. Behind wall wood blocking for support of toilet accessories, wall cabinets, wainscots and miscellaneous other wall-hung/attached accessories.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in division 1 of these Specifications.
 - 2. Division 5 - Metals

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Codes and standards:
 - 1. In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Architect comply with:
 - a. "Product Use Manual" of the Western Wood Products Association for selection and use of products included in that manual;
 - b. "Plywood Specification and Grade Guide" of the American Plywood Association;
 - c. "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Bureau for Redwood, when used.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 64 00.
- B. Protection:
 - 1. Deliver the materials to the job site and store, in a safe area, out of the way of traffic, and shored up off the ground surface.
 - 2. Identify framing lumber as to grades, and store each grade separately from other grades.
 - 3. Protect metals with adequate waterproof outer wrapping.
 - 4. Use extreme care in off loading of lumber to prevent damage, splitting, and breaking of materials.

PART 2 - PRODUCTS

2.1 GRADE STAMPS

- A. Identify framing lumber by the grade stamp of the Southern Pine Inspection Bureau, or such other grade stamp as is approved in advance by the Architect.
- B. Identify plywood as to species, grade, and glue type by the stamp of the American Plywood Association.

- C. Identify other materials of this Section by the appropriate stamp of the agency approved in advance by the Architect.

2.2 MATERIALS

- A. Provide new materials (not previously used for any other purpose) in the quantities needed for the Work shown on the Drawings, and meeting or exceeding the following standards of quality:
 - 1. Horizontal and vertical framing members: Southern pine of fir, #2 minimum in sizes/dimensions as noted on the Drawings.
 - 2. Miscellaneous framing and blocking: Southern pine or fir, #3 minimum.
 - 3. Roofing nailers and sill plates (any wood in contact with concrete): Southern pine #3 minimum, pressure treated in accordance with the Standard Specifications of the American Wood Preservers Association.
 - 4. Plywood:
 - a. Wall Sheathing:
 - 1. Interior Walls: Fire Retardant, APA stated sheathing, exposure 1, 1/2" or other sizes as noted on the Drawings.
 - 5. Interior Gypsum Sheathing: Provide U.S. Gypsum "Sheetrock" or approved equal, 5/8" thick (Hi-Impact) or 1/2" thick (Firecode), as noted on Drawings, complying with ASTM C36.

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 DELIVERIES

- A. Stockpile materials sufficiently in advance of need to assure their availability in a timely manner for this Work.
- B. Make as many trips to the job site as are needed to deliver materials of this Section in a timely manner to ensure orderly progress of the Work.

3.4 COMPLIANCE

- A. Do not permit materials not complying with the provisions of this Section to be brought onto or to be stored at the job site.
- B. Promptly remove non-complying materials from the job site and replace with materials meeting the requirements of this Section.

3.5 WORKMANSHIP

- A. Produce joints which are tight, true, and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.
- B. Selection of lumber pieces:
 - 1. Carefully select the members.
 - 2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing, and will allow making of proper connections.
 - 3. Cut out and discard defects which render a piece unable to serve its intended function.
 - 4. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
- C. Do not shim any framing component.

3.6 GENERAL FRAMING

- A. General:
 - 1. In addition to framing operations normal to the fabrication and erection indicated on the Drawings, install wood blocking and backing required for the work of other trades.
 - 2. Set horizontal and sloped members with crown up.
 - 3. Do not notch, cut, or bore members for piped, ducts, or conduits, or for other reasons except as shown on the Drawings or as specifically approved in advance by the Architect.
- B. Bearings:
 - 1. Make bearings full unless otherwise indicated on the Drawings.
 - 2. Finish bearing surfaces on which structural members are to rest so as to give sure and even support.
 - 3. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

3.7 BLOCKING AND BRIDGING

- A. Install blocking as required to support items of finish (millwork, cabinets, accessories, etc.) and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor areas.
- B. Bridging:
 - 1. Install wood cross bridging (not less than 2" x 3" nominal), metal cross bridging of equal strength, or solid blocking between joists where the span exceeds 8'-0".
 - 2. Provide maximum distance of 8'-0" between a line of bridging and a bearing.
 - 3. Cross bridging may be omitted for roof and ceiling joists where the omission is permitted by code, except where otherwise indicated on the Drawings.
 - 4. Install solid blocking between joists at points of support and wherever sheathing is discontinuous. Blocking may be omitted where joists are supported on metal hangers.

3.8 ALIGNMENT

- A. On framing members to receive a finished surface align the finish subsurface to vary not more than 1/8" from the plane of surfaces of adjacent furring and framing members.

3.9 INSTALLATION OF PLYWOOD SHEATHING

- A. Placement:
 - 1. Place plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise shown on the Drawings.
 - 2. Center joints accurately over supports, unless otherwise shown on the Drawings at roof sheathing, all joints not centered over supports shall be attached with metal panel clips at 2'-0" o.c. maximum.

- B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component or finish.

3.10 FASTENING

A. Nailing:

1. Provide common wire nails or spikes with penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike, provided, however, that 16d nails may be used to connect two pieces of 2" (nominal) thickness.
2. Nail without splitting wood.
3. Prebore as required.
4. Remove split members and replace with members complying with the specified requirements.
5. Nailing Schedule

CONNECTION		NAILING
1. Joist to sill or girder, toenail		3 - 8d
2. Bridging to joist, toenail each end		2 - 8d
3. Bottom Plate to joist or blocking, face nail		16d at 16 inches o.c.
4. Top plate to stud, end nail		2-16d
5. Stud to bottom plate	4-8d, toenail or 2-16d, end nail	
6. Double studs, face nail		16d at 24 inches o.c.
7. Double top plates, face nail		16d at 16 inches o.c.
8. Top plates, laps and intersections, face nail		2 - 16d
9. Continuous header, two pieces	16d at 16 inches o.c.along each edge	
10. Ceiling joists to plate, toenail		3 - 8d
11. Continuous header to stud, toenail		4 - 8d
12. Ceiling joists, laps over partitions, face nail		3 - 16d
13. Ceiling joists to parallel rafters, face nail		3 - 16d
14. Rafter to plate, toenail		3 - 16d
15. Built-up corner studs	16d at 24 inches o.c.	
16. Built-up beams	20d at 32 inches o.c. at	
top and bottom staggered	2 - 20d at ends and at each splice	

B. Bolting:

1. Drill holes 1/16" larger in diameter than the bolts being used.
2. Drill straight and true from one side only.
3. Do not bear bolt threads on wood, but use washers under head and nut where both bear on wood, and use washers under all nuts.

C. Screws:

1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.

3.11 MISCELLANEOUS ITEMS

- A. Install all items of this Section at the locations shown on the Drawings and in accordance with the approved Shop Drawings.
- B. Install all items in strict accordance with manufacturers written installation and cleaning instructions.

END OF SECTION

SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior running and standing trim.
 - 2. Adjustable shelving, shelf standards, and brackets.
- B. Related Documents: The Contract Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

- A. American Woodworking Institute (AWI):
 - 1. AWI AWQS - Architectural Woodwork Quality Standards, 6th Edition Version 1.0.
- B. United States Department of Commerce Product Standard (PS):
 - 1. PS 20 - American Softwood Lumber Standard.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Custom quality.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016400 - Material and Equipment: Transport, handle, store, and protect products.

PART 2 - PRODUCTS

2.1 ADJUSTABLE SHELIVING: Wall mounted, not within cabinets. (Noted "Shelves", or "Shelving" on Drawings.)

- A. Standards: flush mount shelf standards. Style: 80STB, Finish: Statuary Bronze, MFR: Knappe & Vogt or approved substitution.
- B. Brackets. Style: 180STB, Finish: Statuary Bronze, MFR: Knappe & Vogt or approved substitute.
- C. Length as required for shelves - Plywood for Shelves: Softwood plywood; PS 1, graded in accordance with AWI, suitable for paint finish. (Shelves can be plastic laminate finish at all faces/surfaces at Contractor's option.)
 - 1. Dimensions: 3/4 inch thick x 12 inches deep x maximum possible length, with 1 x 2 continuous hardwood edge at all edges. (See drawings for other sizes.)
 - 2. Quantity: Five (5) shelves per wall, where "shelves" shown on the Drawings.
- D. Fasteners: Size and type to suit application.

2.2 INTERIOR FINISH CARPENTRY

- A. Trim and boards for transparent/stain finish: Plain sliced birch. Sizes as indicated on the Drawings.
- B. Trim, boards, and plywood for painted finish: Softwood suitable for exposure and use.
 - 1. Fasteners: Size and type to suit application.

- B. Plywood for transparent/stain finish: Plain sliced birch, 3 ply construction minimum, with one face veneer. Thicknesses as indicated on Drawings.

2.3 COMPOSITE LUMBER (POLYMER LUMBER)

- A. Trim for wall base at "plywood walls" (See Drawings) to be Trex Cladding, Transcend, 1" x 5.5", Vintage Lantern Color, with Cap-Tor XD Screws with pro-plug system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to commencing work of this Section.
- B. Site Verification of Conditions:
 - 1. Examine areas in which Work of this Section is to be performed.
 - 2. Verify that surfaces and site conditions are ready to receive Work.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install wood component work in accordance with AWI AWQS, Section 1700 - Installation of Woodwork. Install Composite Lumber components as per manufacturer's installation instructions.
- B. Install Work plumb, level, and straight without distortion; use concealed shims. Scribe and cut Work to fit adjoining work. Anchor Work items to nailers or blocking or directly to substrate using concealed fasteners.
- C. Install shelving units, standards, and brackets at locations as indicated as "shelves", or other similar notation, on Drawings (five shelves per wall). Standards shall be spaced no more than 32" o.c. apart.
- D. Install all solid wood trim with finishing nails, filling each nail head with product matching stain color.
- E. Glue all hardwood veneer plywood to substrates with manufacturers approved glue.
- F. Paint and/or stain, as noted in this section or on the Drawings, as per Section 099000 - Paint.

3.3 ADJUSTING

- A. Adjust installed work. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

- A. Section 017400 - Cleaning: Cleaning installed work.
- B. Clean shelves, hardware, fittings, and fixtures.
- C. Clean and polish with an approved penetrating furniture oil all stained trim boards and hardwood veneer plywood.

END OF SECTION

SECTION 070160 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide flashing and sheet metal not specifically described in other Sections of these Specifications but required to prevent penetration of water through the exterior shell of the building.
- B. Related work:
 - 1. Documents affecting Work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Section in Division 1 of these Specifications.
 - 2. Section 133419 - Pre-Engineered Metal Building

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. In addition to complying with pertinent codes and regulations, comply with pertinent recommendations contained in current edition of "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
- C. Standard items may be used for flashing, trim, reglets, and similar purposed provided such item meet or exceed the quality standards specified.

1.3 SUBMITTALS

- A. Product data:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades;
 - 4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 MATERIALS AND GAGES

- A. Where sheet metal is required and no material or gage is indicated on the Drawings, provide the highest quality and gage commensurate with the referenced standards.
- B. Where shown on the Drawings at locations noted "metal parapet cap", "conductor", "thru-wall scupper" "metal flashing", "counter flashing" or similar note, provide 24 gauge steel, pre-finished (Kynar 500 coating) metal equal to Colorklad. "Gutters" shall be 24 gauge steel, shop fabricated with Kynar 500 finish.
- C. Where shown on the Drawings at locations noted "copper flashing", "copper counterflashing", or similar "copper"

FLASHING AND SHEET METAL

note, provide 16 oz. (0.0216" thick) ASTM 8370 cold rolled copper except where soft temper is required for forming.

- D. Nails, Rivets and Fasteners:
 - 1. Fasteners: Hard copper, brass or bronze.
 - 2. Nails for wood and nailing concrete: flathead, barbed, wire slating nails not less than No. 12 gage, 1" long.
 - 3. Screws and bolts: Round heads.
- E. Solder: ASTM B32; 50% tin, 50% lead.
- F. Flux: Rosin, muriatic acid neutralized with zinc or approved equal.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Install flashing at all locations as shown on Drawings. Install all materials as per Manufacturer's Recommendations.

3.3 WORKMANSHIP

- A. General:
 - 1. All work must conform/meet SMACNA Standards and Drawing Details, for each specific location where flashing and sheet metal are installed.
 - 2. Form sheet metal accurately and to the dimensions and shapes required, finishing molded and broken surfaces with true, sharp, and straight lines and angles and, where intercepting other members, coping to an accurate fit and soldering securely.
 - 3. Unless otherwise specifically permitted by the Architect, turn exposed edges back ½".
- B. Form, fabricate, and install all sheet metal so as to adequately provide for expansion and contraction in the finished Work.
- C. Weatherproofing:
 - 1. Finish watertight and weathertight where so required.

2. Make lock seam work flat and true to line, sweating full of solder.
3. Make lock seams and lap seams, when soldered, at least $\frac{1}{2}$ " wide.
4. Where lap seams are not soldered, lap according to pitch, but in no case less than 3".
5. Make flat and lap seams in the direction of flow.
6. All parapet caps shall have locking (knock-on) seams at $\pm 6'$ on center, with expansion joints at 40' on center.

D. Joints:

1. Join parts with rivets or sheet metal screws where necessary for strength and stiffness.
2. Provide suitable watertight expansion joints for runs of more than 40'-0", except where closer spacing is indicated on the Drawings or required for proper installation.

E. Nailing:

1. Whenever possible, secure metal by means of clips or cleats, without nailing through the exterior metal.
2. In general, space nails, rivets, and screws not more than 8" apart and, where exposed to the weather, use lead washers.

3.4 SOLDERING

A. General:

1. Thoroughly clean and tin the joint materials prior to soldering.
2. Perform soldering slowly, with a well heated copper, in order to heat the seams thoroughly and to completely fill them with solder.
3. Perform soldering with a heavy soldering copper of blunt design, properly tinned for use.
4. Make exposed soldering on finished surfaces neat, full flowing, and smooth.

- B.** After soldering, thoroughly wash acid flux with a 5% to 10% solution of washing soda, then drench with clean water.

3.5 TESTS

- A.** Upon request of the Architect, demonstrate by hose or standing water that the flashing and sheet metal are completely watertight.

END OF SECTION

SECTION 072100 - BUILDING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide building insulation where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data:
 - 1. Materials list of items to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provision of Section 016400.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide the following building insulation where shown on the Drawings or otherwise needed to achieve the degree of insulation required under pertinent regulations of governmental agencies having jurisdiction.
 - 1. Batt Insulation:
 - a. Interior Metal Stud / Gypsum Board Sheathing Walls: Sound batts, 3 ½" or 6" unfaced fiberglass, at locations as noted on Drawings.
 - 2. Mechanical and Plumbing Insulation: See "Schedules" on drawings, "M" and "P" sheets.
 - 3. Batt Insulation System at Pre-Engineered Metal Building
 - a. All Roofs Receiving Metal Roof Panels: "Simple Saver System" for roofs as manufactured by Thermal Design, Inc. (1-800-255-0776) with an insulation of R-24, not to exceed 8" thick, 3/8" Snap-R Thermal block, white steel straps and white vinyl liner fabric.
 - b. R19 vinyl faced batt insulation at all exterior walls.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Remove, or protect against, projections in construction framing which may damage or prevent proper insulation.

3.2 INSTALLATION

- A. Install the work of this Section in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position.
- B. ALL INSULATED PLUMBING (WATER) LINES AT EXTERIOR WALLS SHALL BE INSTALLED SO THAT THE INSULATION WITHIN THESE WALLS IS BETWEEN THE WATER PIPES AND THE EXTERIOR WALL SURFACE.
- C. All penetrations through the exterior wall sheathing, and/or wall construction, shall be filled with expanding spray foam (polyurethane) insulation.
- D. The Architect shall inspect all insulation prior to the installation of preceding layers of finish material. Give Architect 24 hours notice before wall sheathing is to begin.
- E. All interior metal stud walls shall receive sound batt insulation for full height of wall.
- F. All roof drain lines, within the building, shall be insulated as per the schedules on the "M" and "P" sheets of the Drawings.

END OF SECTION

SECTION 072700 - FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide through-penetration firestopping in fire rated construction, construction-gap firestopping at connections of the same or different materials in fire rated construction, construction-gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies, construction-gap firestopping occurring at the top of fire rated walls, through-penetration smoke-stopping in smoke partitions where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Section 092600 - Gypsum Wallboard System

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
 - 1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
 - 2. At least 2 years experience with systems.
 - 3. Successfully completed at least 5 comparable scale projects using this system.
- B. Local and state regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the construction.
- D. References
 - 1. Underwriters Laboratories - U.L. Fire Resistant 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. American Society for Testing and Materials standards:
 - a. ASTM E814 - 88: Standard Test Method for Fire Tests of Through-Penetration Firestops.
- E. Definitions
 - 1. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
 - 2. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
 - 3. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
 - 4. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
 - 5. 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
 - 6. System: specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
 - 7. 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.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400 - Submittals and Substitutions.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400 - Product Handling.
- B. Packing and shipping:
 - 1. Deliver products in original unopened packaging with legible manufacturer's identification.
 - 2. 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.

1.5 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
 - 2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.
- B. 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 flame.
 - 4. Provide masking and drop cloths 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.

1.6 GUARANTEE

- A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fall in joint adhesion, co-adhesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability or appear to 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 2 - PRODUCTS

2.1 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms 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.
 - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product, included as a part of the U.L. system or device, and designed to perform this function.

2. Acceptable manufacturers and products;
 - a. Those listed in the U.L. Fire Resistance directory for the U.L. System involved.
3. All firestopping products must be from a single manufacturer. All trades shall use products from the same manufacturer.

2.2 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.
- B. Firestopping at construction gaps between tops of partitions and underside of structural systems.
- C. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly.
- D. Firestopping of control joints in fire-rated masonry partitions.
- E. Firestopping expansion joints and any opening made through a fire rated wall.
- F. Acceptable manufacturers and products - those listed in the U.L. Fire Resistance Directory for the U.L. System involved.

2.3 SMOKE-STOPPING AT SMOKE PARTITIONS

- A. Through-penetration smoke-stopping: Any system complying with the requirements for Applications Schedule in Part 3.06 of this Section, is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.
- B. Construction-gap smoke-stopping: Any system complying with the requirements for construction-gap firestopping in fire-rated construction is acceptable, provided that the systems includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.4 ACCESSORIES

- A. Fill, void or cavity materials: As classified under category XHHW in the U.L. Fire Resistance Directory.
- B. Forming materials: As classified under category XHKU in the U.L. Fire Resistance Directory.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described by required for a complete and proper installation, as selected by the Contractor, subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
 - 1. Verify barrier penetrations are properly sized and in suitable conditions for application of materials.

3.3 PREPARATION

- A. Clean surfaces to be in contact with penetration seal materials, of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion, or the required fire resistance.

3.4 INSTALLATION

- A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory 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. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturers recommendations.
- F. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See U.L. Fire Resistance Directory.
- G. Install smoke stopping as specified for firestopping.
- H. 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.

3.5 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.

3.6 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 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Prefabricated roof curb and equipment supports (pipe supports) complete with insulated integral support curb and counter flashings; roof ladders.
- B. Coordinate with installation of roofing and related metal flashings.
- C. All horizontal sheet metal surfaces shall receive a cross break to sheet rain water.

1.2 RELATED WORK

- A. Section 061000 - Rough Carpentry.

1.3 SUBMITTALS

- A. Submit shop drawings and product literature showing complete product information and installation procedures.
- B. Clearly indicate general construction, configurations, jointing methods and locations when applicable, fastening methods and installation details.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Curbs and Equipment Supports:
 - 1. Custom Curbs, Inc.
 - 2. ThyCurb.
- B. Pipe Supports:
 - 1. Miro Industries
 - 2. Or equal.

2.2 CURBS AND EQUIPMENT SUPPORTS

- A. Size to fit openings and equipment.
- B. Shall be of box section design, heavy gauge galvanized steel construction. Thycurb, Model TC-3 MBDN (or equal), insulated, at "standing seam metal" roofs, or equal. **Curbs shall be 8"H., minimum and constructed to follow slope of roof, with top of curb being level.**

2.3 PIPE SUPPORTS (GAS PIPES AND ELECTRICAL CONDUIT AT THE ROOF)

- A. Miro Industries, Model 4-RAH, 5-SB-H, or other appropriate size as required for proper support, each with Miro Support pad.
- B. Spacing of supports shall be 10' o.c. max.

2.4 PIPE FLASHING AT METAL PANEL ROOFING

- A. Dektite square, or round, silicone (EPDM) as manufactured by DEKS, Skellerup Industries company, or equal, sized to fit pipe diameter.

2.5 FABRICATION

- A. Fabricate accessories weathertight, and free of visual distortions and defects.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories in strict accordance with manufacturer's written instructions, guidelines and/or recommendations and details. Coordinate with installation of roofing systems and related flashings, and wall systems.

END OF SECTION

SECTION 079200 - SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the Work, at all interior and exterior locations, seal and calk joints where shown on the Drawings, and where dissimilar materials abut one another, and elsewhere as required to provide a positive barrier against passage of moisture and passage of air. (No matter how tight the joint, or material abutment may be.)
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 033000 - Cast in Place Concrete
 - 3. Section 072700 - Firestopping

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- C. Samples: Accompanying the submittal described above, submit Samples of each sealant, each backing material, each primer, and each bond breaker proposed to be used.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.
- B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

PART 2 - PRODUCTS

2.1 SEALANTS

- A. Except as specifically otherwise approved by the Architect, use only the types of sealants described in this Article.
- B. Provide sealants by Sonneborn/Rexnord, or equal, as follows:
 - 1. Exterior Sealant: Sonolastic NPI or NP2 at all locations except exterior metal wall panels. Color(s) as selected by Architect. Dow Corning 795 silicone building sealant at exterior metal wall panels, color(s) as selected by Architect.
 - 2. Fixture Sealant: Omniplus, white
 - 3. Interior Sealant: Sonolac, colors as selected by Architect.

- 4. Concrete Expansion Joint Sealer: SL-1, one part self-leveling polyurethane sealant.

2.2 PRIMERS

- A. #733 by Sonneborn/Rexnord or approved equal.

2.3 BACKUP MATERIALS

- A. Backer Rod: Closed cell polyethylene foam. Sonnefoam backer rod by Sonneborn/Rexnord or equal.
- B. Concrete expansion joint filler: W.R. Meadows, Inc. Sealtight Fibre Expansion Joint Filler, or equal (thicknesses and heights as shown on the drawings).

2.4 ACOUSTICAL SEALANT

- A. Tremco Acoustical Sealant, by Tremco. Tel. (216) 292-5000.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 PREPARATION

- A. Concrete surfaces:
 - 1. Install only on surfaces which are dry, sound, and well brushed, wiping free from dust.
 - 2. At open joints, remove dust by mechanically blown compressed air if so required.
 - 3. Use solvent to remove oil and grease, wiping the surfaces with clean rags.
 - 4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
 - 5. Remove laitance and mortar from joint cavities.
 - 6. Where backstop is required, insert the approved backup material into the joint cavity to the depth needed.
 - 7. **CONCRETE EXPANSION JOINT SEALER AND FILLER SHALL BE INSTALLED AT ALL CONCRETE-TO-CONCRETE OR CONCRETE-TO-BUILDING ABUTMENTS AND THE FILLER SHALL BE FULL DEPTH OF**

CONCRETE.

- B. Steel surfaces:
 - 1. Steel surfaces in contact with sealant:
 - a. Sandblast as required to achieve acceptable surface for bond.
 - b. If sandblasting is not practical, or would damage adjacent finish, scrape the metal or wire brush to remove mill scale.
 - c. Use solvent to remove oil and grease, wiping the surfaces with clean rags.
 - 2. Remove protective coatings on steel by sandblasting or by using a solvent which leaves no residue.
- C. Aluminum surfaces:
 - 1. Aluminum surfaces in contact with sealant:
 - a. Remove temporary protective coatings, dirt, oil and grease.
 - b. When masking tape is used for protective cover, remove the tape just prior to applying the sealant.
 - 2. Use only such solvents to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, and which are non-staining.

3.4 INSTALLATION OF BACKUP MATERIAL

- A. Compress the backup material 25% to 50% to achieve a positive and secure fit.
- B. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.
- C. Use at all joints wider than 3/8".

3.5 PRIMING

- A. Use only the primer recommended by the manufacturer of the sealant, and approved by the Architect for the particular installation, applying in strict accordance with the manufacturer's recommendations as approved by the Architect.

3.6 BOND-BREAKER INSTALLATION

- A. Provide an approved bond-breaker where recommended by the manufacturer of the sealant, and where directed by the Architect, adhering strictly to the installation recommendations as approved by the Architect.

3.7 LOCATIONS FOR FIXTURE SEALANT

- A. Place fixture sealant at all plumbing fixtures and casework where they meet the floor or wall.

3.8 INSTALLATION OF SEALANTS

- A. General: Place sealants at all interior and exterior locations where dissimilar materials meet and at joints that do not close tight. Use at exterior and interior door and window openings. Use at existing to new construction joints. Use at all dissimilar material abutments/joints.
- B. Prior to start of installation in each joint, verify the joint type according to details on the Drawings, or as otherwise directed by the Architect, and verify that the required proportion of width of joint to depth of joint has been secured.
- C. Equipment:

1. Apply sealant under pressure with power-actuated or hand gun, or by other appropriate means.
 2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.
- D. Thoroughly and completely mask joints where the appearance of sealant on adjacent surfaces would be objectionable.
- E. Install the sealant in strict accordance with the manufacturer's recommendations as approved by the Architect, thoroughly filling joints to the recommended depth. Use backup material at all joints wider than 3/8".
- F. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.
- G. Cleaning up:
1. Remove masking tape immediately after joints have been tooled.
 2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.

END OF SECTION

SECTION 08100 - METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide metal doors, and metal door and window frames, which are not specifically described in other Sections of these Specifications, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 087100 - Finish Hardware
 - 3. Section 092600 - Gypsum Wallboard System
 - 4. Section 099000 - Paint
 - 6. Section 133419 - Pre-Engineered Metal Building

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100).

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.;
 - 2. Shop Drawings showing details of each frame type, elevations of door designs, details of openings, and details of construction, installation, and anchorage.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 METAL DOORS

- A. Typical: Steelcraft L-18 (18 gauge) or approved equal, Flush, with polystyrene core (R = 7.7) with solid cap and sill. Prepare door for all hardware and narrow lite (if applicable) as per door schedule on Drawings. All doors to have solid vinyl snap-in cap option at head. All exterior doors shall have metal drip edge above door, attached to metal door frame.
- B. Finish:
 - 1. Pre-clean and shop prime each door for finish painting which will be performed at the job site under Section 099000 of these Specifications.
- C. Doors within fire rated walls shall be equivalent fire rating as rated wall.

- D. Lite Trim: Steelcraft designer trim, or equal.

2.2 METAL FRAMES

- A. Type and design: F 16-4 Flush Frame by Steelcraft or approved equal, properly reinforced for finish hardware described in Section 087100 of these Specifications.
1. Fabricate frames with mitered and welded corners.
 2. Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.
 3. Frames used for interior "windows" are to have a 3/4-hour UL rating.
 4. Frames within fire rated walls shall have equivalent fire rating as rated wall.
- B. Frames with 2" face shall be provided with anchors to suit wall construction as shown on Drawings. Frames with 1" face shall be provided with:
1. Masonry jamb anchors and welded in base anchors: A minimum of 6 jamb anchors and 2 base anchors shall be supplied with each frame.
 2. Wood stud or closed steel stud, jamb/base anchors: A minimum of 16 anchors shall be supplied with each frame, 8 anchors to be used on each face of frame.
- C. Finish:
1. Pre-clean and shop prime each frame for finish painting which will be performed at the job site under Section 099000 of these Specifications.

2.3 FINISH HARDWARE

- A. Secure templates from the finish hardware supplier, and accurately install, or make provision for, all finish hardware at the factory.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 INSTALLATION

- A. Install standard doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.

3.4 ADJUST AND CLEAN

- A. Final adjustments:
 - 1. Check and readjust operating finish hardware items in hollow metal work just prior to final inspection.
 - 2. Leave work in complete and proper operating condition.
 - 3. Remove defective work and replace with work complying with the specified requirements.
- B. Immediately after erection, sand smooth all rusted and damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

END OF SECTION

SECTION 082100 - WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flush Wood Doors.
 - 2. Flush Wood Doors with Lites
- B. Related Documents: The Contract Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 081000 - Metal Doors and Frames: Metal frames for wood doors.
 - 2. Section 087100 - Door Hardware: Hardware coordination.
 - 3. Section 099000 - Paint: Field painting/staining of doors and frames.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM);
 - 1. ASTM E 152 - Methods of Fire Tests of Door Assemblies.
- B. Architectural Woodwork Institute (AWI):
 - 1. AWI 1300 - Flush Hollow and Solid Core Doors.
- C. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA LD-3 - High Pressure Decorative Laminates.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Specification for Fire Doors and Windows.

1.3 SUBMITTALS

- A. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with AWI 1300 for Custom Grade.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Fire Door Construction: Conform to ASTM E 152.
 - 2. Installed Fire Rated Door Assembly: Conform to NFPA 80.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 016400 – Product Handling: Transport, handle, store, and protect products.
- B. Package, deliver, and store doors in accordance with AWI Section 01300.

1.6 WARRANTY

- A. Section 017800 - Close-Out Submittals: Procedures for closeout submittals.
- B. Special Warranty:
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
 - 2. Warranty Period: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. Mohawk, Architectural Series, 5-ply agri-fiber, WDMA: Extra heavy duty, PC-5
- B. Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Solid Core Wood Doors (Interior Use): AWI 1300, 5ply minimum.
 - 1. Thickness: 1 3/4" unless noted otherwise on Drawings.
 - 2. Face Veneer: AWI Custom quality, plain sliced birch for factory/manufacturer stain finish. (Stain color to match existing, but Architect and/or Owner to select stain color from manufacturer's full "standard" color range.)
 - 3. Core Construction:
 - a. Non Fire-Rated: Agri-Fiber, minimum LD-1
 - b. Fire-Rated: Type FD-5, non-asbestos fire rated material per label/fire rating requirements.
 - 4. Grade: AWI Custom.
- B. Solid Core Wood Doors with Lites (Interior Use): AWI 1300, 5 ply minimum
 - 1. Thickness: 1-3/4" unless noted otherwise on Drawings.
 - 2. Face Veneer: AWI Custom quality, plain sliced birch for factory/manufacturer stain finish. (Stain color to match existing, but Architect and/or Owner to select stain color from manufacturer's full "standard" color range.)
 - 3. Core Construction:
 - a. Non Fire-Rated: Agri-Fiber, minimum LD-1
 - b. Fire-Rated: Type FD-5, non-asbestos fire rated material per label/fire rating requirements.
 - 4. Glass: Wire Glass, or Safety Glass - See Drawings.
 - 5. Lite Configuration: See Drawings
 - 6. Grade: AWI Custom
- C. Provide fire-rated labeled doors (and frames) where indicated on Drawings.

- D. Lites: Provide openings for lites as indicated on the Drawings. Beads for lites shall be wood to match door.**

2.3 FABRICATION

- A. Fabricate non fire-rated doors in accordance with AWI 1300.
- B. Fabricate fire-rated doors to AWI 1300 and to Underwriters Laboratories Incorporated requirements. Attach fire rating label to doors.
- C. Furnish and install lock blocks at lock edge, and top of door closer for hardware reinforcement.
- D. Vertical Exposed Edge of Stiles: Mill Option
- E. Bond edge banding to cores.
- F. Factory machine door for door hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- G. Factory fit doors for frame opening dimensions identified on approved shop drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION

- A. Install non fire-rated doors in accordance with AWI Quality Standards requirements.
- B. Install fire-rated doors in accordance with AWI Quality Standard and NFPA 80 requirements.
- C. Machine cut for hardware. Install door hardware specified in Section 08710.
- D. Install door louvers plumb and level.
- E. Field stain doors which may not be/are not factory finished as specified in Section 09900, color to be selected as per submitted stain samples.
- F. Coordinate installation of glazing and glass within wood doors.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate frame installation with size, location, and installation.
 - 2. Coordinate with door opening construction, door frame, and door hardware installation.
- B. Site Tolerances:
 - 1. Conform to AWI requirements for fit and clearance tolerances.
 - 2. Conform to AWI 1300 requirements for maximum diagonal warp.

3.4 FIELD QUALITY CONTROL

- A. Inspect door and frame installation, alignment, attachment to structure, hardware installation, and operation.

3.5 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.

3.6 PROTECTION

- A. Protect finished Work from damage. Replace any damaged items.

END OF SECTION

SECTION 08 36 00

SECTIONAL OVERHEAD DOORS
INSULATED STEEL DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Insulated Sectional Overhead Doors.

1.2 REFERENCES

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wiring Connections: Requirements for electrical characteristics.
 - 1. 115 volts, single phase, 60 Hz.
 - 2. 230 volts, single phase, 60 Hz.
- B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.4 SUBMITTALS

- A. Submit under provisions of Section 013400.
- 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: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

1.7 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.8 WARRANTY

- A. Warranty: Manufacturer's limited door and operators System warranty for 10 years against delamination of polystyrene foam from steel face and all other components for 1 year and covered under General Conditions of Contract.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: arcat@overheaddoor.com.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED SECTIONAL OVERHEAD DOORS

- A. Insulated Steel Sectional Overhead Doors: 470 Series Insulated Steel Doors by Overhead Door Corporation. Units shall have the following characteristics:
 - 1. Door Assembly: Rigid steel construction; fully insulated on the inside face with continuous steel backing on the inside face. Fabricated with steel end stiles and tongue and groove sections.
 - a. Panel Thickness: 2 inches (51 mm).
 - b. Exterior Surface: Ribbed.
 - c. Exterior Steel: 26 gauge, hot-dipped galvanized with an embossed simulated wood grain texture.
 - d. Interior Steel: 29 gauge, hot-dipped galvanized
 - e. Springs:
 - 1) 10,000 cycles.
 - f. Insulation: Polystyrene.
 - g. Thermal Values:
 - 1) Polystyrene - R-value of 9.83; U-value of 0.102.
 - h. Partial Glazing of Steel Panels
 - 1) 19" x 12" Windows, Solar Bronze
 - 2. Finish and Color: Two coat baked-on polyester. Color as follows: (to be selected by Architect and/or Owner from)
 - a. White
 - b. Almond
 - c. Brown
 - d. Sandstone
 - e. Desert Tan

3. Lock:
 - a. Interior mounted slide lock with interlock switch for automatic operator.
4. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
5. Track: Provide track as recommended by manufacturer to suit loading required and clearances available. Follow the Roof Slope Track.
6. 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. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
 - a. Entrapment Protection: Required for momentary contact, includes radio control operation.
 - 1) Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
 - b. Operator Controls:
 - 1) Push-button operated control stations with open, close, and stop buttons.
 - 2) Surface mounting.
 - 3) Interior location.
 - c. Special Operation:
 - 1) Explosion and dust ignition proof control wiring.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean adjacent surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.4 CLEANING AND ADJUSTING

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames, glass and polycarbonate according to manufacturer's instructions.
- C. Remove temporary labels and visible markings. Do not remove polycarbonate care and maintenance label required to maintain warranty.

3.5 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware, power supplies, back-ups and surge protection.
 - 3. Automatic operators.
 - 4. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Section 061000 – Rough Carpentry
 - 2. Section 062000 – Finish Carpentry
 - 3. Section 081000 – Hollow Metal Doors and Frames
 - 4. Section 082100 – Wood Doors
 - 5. Section 088000 – Glazing
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
 - 3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
 - 4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
 - 5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
 - 6. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
 - 7. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
 - 8. ICC/IBC - International Building Code.
 - 9. NFPA 70 - National Electrical Code.
 - 10. NFPA 80 - Fire Doors and Windows.
 - 11. NFPA 101 - Life Safety Code.
 - 12. NFPA 105 - Installation of Smoke Door Assemblies.
 - 13. TAS-201-94 - Impact Test Procedures.
 - 14. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
 - 15. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
 - 16. [State Building Codes, Local Amendments].
- E. Standards: All hardware specified herein shall comply with the following industry standards:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series
 - 2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.4 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.5 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Five years for exit hardware.
 - 3. Ten years for manual door closers.
 - 4. Two years for electromechanical door hardware.

1.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
 - c. Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
 4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
 - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
 - 1) Out-swinging exterior doors.
 - 2) Out-swinging access controlled doors.
 5. Acceptable Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products (MK).
 - c. Stanley Hardware (ST).

- B. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.
1. Acceptable Manufacturers:
 - a. McKinney Products (MK).
 - b. Pemko Manufacturing (PE).
 - c. Stanley Hardware (ST).

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
1. Acceptable Manufacturers:
 - a. McKinney Architectural Hardware (MK).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, 4-inches wide by 16-inches high, with square corners and beveled edges, secured with exposed screws unless otherwise indicated.
 2. Straight Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection from face of door unless otherwise indicated.
 3. Offset Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection and offset of 90 degrees unless otherwise indicated.
 4. Push Bars: Minimum 1-inch round diameter horizontal push bars with minimum clearance of 2 1/2-inch projection from face of door unless otherwise indicated.
 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - a. Acceptable Manufacturers:
 - 1) McKinney Architectural Hardware (MK).
 - 2) Rockwood Manufacturing (RO).
 - 3) Trimco (TC).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
 1. Acceptable Manufacturers:
 - a. Yale Locks and Hardware (YA)
- E. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
 1. Master Key System: Cylinders are operated by a change key and a master key.
 2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
 3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
 4. Existing System: Master key or grand master key locks to Owner's existing system.
 5. Keyed Alike: Key all cylinders to same change key.
- F. Key Quantity: Provide the following minimum number of keys:
 1. Top Master Key: One (1)
 2. Change Keys per Cylinder: Two (2)
 3. Master Keys (per Master Key Group): Two (2)
 4. Grand Master Keys (per Grand Master Key Group): Two (2)
 5. Construction Control Keys (where required): Two (2)
 6. Permanent Control Keys (where required): Two (2)
- G. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".
- H. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
 1. Provide mortise lock bodies functionally compatible with a rose-less lever trim option.
 2. Acceptable Manufacturers:
 - a. Yale Locks and Hardware (YA) – 8800FL Series.
 - b. Schlage L9000
 - c. Falcon M Series
- B. Lock Trim Design: As specified in Hardware Sets.
- C. Hurricane and Tornado Resistance Compliance: Mechanical locking and latching devices to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have

been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
 - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
 - 4. Dustproof Strikes: BHMA A156.16.

2.7 CONVENTIONAL EXIT DEVICES

- A. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.
 - 1. Acceptable Manufacturers:
 - a. Yale Locks and Hardware 2100 Series (YA)
 - b. Monarch 17/18 Series
 - c. Von Duprin 99 Series

2.8 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 - 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 - 2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 - 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1 provisions for door opening force and delayed action closing.
 - 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
 - b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
 - c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
 - 5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

6. Hurricane and Tornado Resistance Compliance: Door closers to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

- B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units with high impact, non-corrosive plastic covers standard.

1. Acceptable Manufacturers:
 - a. Norton Door Controls (NO) - 8500 Series.
 - b. Yale Locks and Hardware (YA) - 3500 Series.
 - c. LCN (LC) – 1461 Series

2.9 ARCHITECTURAL TRIM

- A. Door Protective Trim
 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
 - a. Stainless Steel: .050-inch thick, with countersunk screw holes (CSK).
 - b. Brass or Bronze: .050-inch thick, with countersunk screw holes (CSK).
 - c. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).
 4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
 5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
 6. Acceptable Manufacturers:
 - a. McKinney Architectural Hardware (MK).
 - b. Rockwood Manufacturing (RO).

2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Acceptable Manufacturers:
 - a. McKinney Architectural Hardware (MK).
 - b. Rockwood Manufacturing (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Acceptable Manufacturers:
 - a. Rixson Door Controls (RF).

- b. Rockwood Manufacturing (RO).
- c. Sargent Manufacturing (SA).

2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: :Assemblies 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 UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Hurricane and Tornado Resistance Compliance: Architectural seals to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- G. Acceptable Manufacturers:
 - 1. McKinney Weatherstripping Products (MW).
 - 2. Pemko Manufacturing (PE).

2.12 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.13 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.
- D. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.
- E. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- G. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. Refer to Hardware Schedule, following this section, for hardware sets.

3.9 ACCESS CONTROL – Applies only if such is noted on the Drawings or the following Hardware Schedule.

- A. All Access Control doors shall have magnetic locks, “Push to Exit” buttons and key fob “swipes” as furnished and installed by IK Electric, 214 MLK Blvd, Little Rock, AR, Bill Lloyd, 501-231-4714, BLLOYD@IK-NS.com. This company shall be a sole source provider for access control for the doors as listed in the Hardware Schedule. They are sole source, because they furnish and maintain all access control at ASU/MH and ASU/MH desires to keep all materials (products) and operation “the same” throughout all buildings at the campus.
- B. Access Control shall be bid and installed as a complete, operational system.

HARDWARE SCHEDULE

Note: 1) All cylinder cores / locks / keys shall match the existing system at the Ozarka College, Melbourne, Arkansas campus.

Set: 01 Classroom SEC Lock

Doors: All single doors at all Classrooms

3	EA	Hinge
1	EA	Classroom Security 9K Dormitory T function
1	EA	Kick Plate
1	EA	Wall Stop
3	EA	Silencer

Set: 02 Mech Closet

Doors: All Mechanical, Electrical, Janitor, and Storage Doors, quantity:

3	EA	Hinge
1	EA	Storeroom/Closet Lock
1	EA	Gasketing

Note: 1) Quantities shall be doubled for pairs of doors and one door shall have flush bolts top and bottom).

Set: 03 Exterior HM Doors

Doors: Exterior single HM Doors:

3	EA	Hinge
1	WA	Rim Exit Device
1	EA	Cylinder -for exit trim
1	EA	Surface Closer
1	EA	Kick Plate
1	EA	Wall Stop
1	EA	Gasketing
1	EA	Metal Drip Edge (At Head)

Set: 04 Restroom

Doors: All "Single" Restroom doors

3	EA	Hinge
1	EA	Deadbolt w/ indicator
1	EA	Passage Set
1	EA	Surface Closer
1	EA	Kick Plate
1	EA	Wall Stop
3	EA	Silencer

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide glazing and glazing accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 081000 - Metal Doors and Frames
 - 3. Section 082100 - Wood Doors

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 PRODUCT HANDLING

- A. During storage and handling of glass, provide cushions at edges to prevent impact damage.

PART 2 - PRODUCTS

2.1 GLASS

- A. General:
 - 1. For all glass, provide the type and thickness shown on the Drawings or specified herein.
 - 2. Where type or thickness, or both, are not shown on the Drawings or specified herein, provide type and thickness directed by the Architect.
- B. Plate or float glass: Comply with Fed Spec DD-G-451, type I, class 1, quality q3.
 - 1. Where plate glass is called for, 1/4" clear plate glass or float glass may be used.
- C. Safety glass: (Insulated, Low "E" and tinted where noted "Safety" on Drawings.)
 - 1. Provide tempered or heat-strengthened glass where indicated on the Drawings, and elsewhere as required by governmental agencies having jurisdiction. Tint shall be selected by Architect from manufacturer's standards.
 - 2. Glass for tempering:
 - a. For plate glass or float glass, use type I, class 1, quality q3.
 - 3. Sizes and cutting:
 - a. Prior to tempering or heat treating, cut glass to required sizes as determined by accurate measurements of the openings to be glazed, making allowances for required edge clearances.
 - b. Cut and process edges in accordance with the glass manufacturer's recommendations.
 - c. Do not cut or treat edges in the field.
 - 4. Fully tempered glass:
 - a. Comply with Fed Spec DD-G-1403 and ANSI Z97.1.
 - b. Wherever possible, locate tong marks along an edge which will be concealed in the glazing system.
 - c. Permit minimum warpage practicable.

- D. Insulating Glass (Low "E")
 - 1. Where noted as "insulating glass" on the Drawings, provide PPG Herculite or equal with 1/4" tinted on the exterior, and 1/4" clear on the interior with 1/2" air space and Low "E" film. Tint shall be selected by Architect from manufacturer's standards.
 - 2. All insulating glass shall be supplied by one manufacturer as approved by the Architect.
- E. Spandrel Glass
 - 1. Where noted "spandrel glass" on Drawings, provide insulated (double pane, 1" thick) units with inner pane of frit (painted) glass and outer pane of tinted tempered glass-coating on inner side of outer panel. Tint to be selected by Architect from manufacturer's standards.
 - 2. All spandrel glass shall be supplied by one manufacturer as approved by the Architect.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Clean glazing channels, stops, and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work.
 - 1. Remove protective coatings which might fail in adhesion or interfere with bond of sealants.
 - 2. Comply with manufacturers' instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes.
 - 3. Prime surfaces to receive glazing compounds in accordance with manufacturers' recommendations.

3.3 INSTALLATION

- A. Inspect each piece of glass immediately prior to start of installation.
 - 1. Do not install items which are improperly sized, have damaged edges, or are scratched, abraded, or damaged in any other manner.
 - 2. Do not remove labels from glass until so directed by the Architect.
 - 3. Install glass so distortion waves, if present, run in the horizontal direction.
- B. Locate setting blocks at sills one quarter of the width of the glass in from each end of the glass, unless otherwise recommended by the glass manufacturer.
 - 1. Use blocks of proper size to support the glass in accordance with the manufacturer's recommendations.
 - 2. Provide spacers for all glass sizes larger than 50 united inches, to separate glass from stops; except where continuous glazing gaskets or felts are provided.
 - a. Locate spacers no more than 24" apart, and no closer than 12" to a corner.
 - b. Place spacers opposite one another.
 - c. Make bite of spacer on glass ½" or more.
- C. Set glass in a manner which produces the greatest possible degree of uniformity in appearance.
- D. Do not use two different glazing materials in the same joint system unless the joint use is approved in advance by the Architect.
- E. Mask, or otherwise protect, surfaces adjacent to installation of sealants.
- F. Miter-cut and seal the joints of glazing gaskets in accordance with the manufacturer's recommendations, to provide watertight and airtight seal at corners and other locations where joints are required.

3.4 PROTECTION

- A. Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass. Do not apply warning markings, streamers, ribbons, or other items directly to the glass except as specifically directed by the Architect.

END OF SECTION

SECTION 092600 - GYPSUM WALLBOARD AND METAL STUD SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide gypsum wallboard, metal studs, vinyl-covered gypsum board gypsum wallboard texture and accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 072100 - Building Insulation

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Standards:
 - 1. American Iron and Steel Institute (AISI) Design of Cold Formed Steel Structural Members, 1980.
 - 2. American Institute of Steel Construction (AISC) Manual of Steel Construction, 8th edition.
 - 3. All pertinent Federal, State and Local codes.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013323.
- B. Product data:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedure used on the work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 GYPSUM PANELS

- A. General:
 - 1. Provide gypsum panels complying with Fed Spec SS-L-30D, in 48" widths and in such lengths as will result in a minimum of joints.
 - a. Gypsum Wallboard: Provide USG 5/8" Firerock brand VHI abuse-resistant gypsum fiber interior panels or approved equal, tapered edge, at all walls up to 8' AFL unless noted otherwise. Above 8'AFL provide USG 5/8" sheetrock firecode core gypsum sheathing, or equal.

2.2 METAL TRIM

- A. Form from zinc-coated steel not lighter than 26 gauge, complying with Fed Spec QQ-S-775, type I, class d or e.
- B. Corner beads: Provide angle shapes with wings not less than 7/8" wide and perforated for nailing and joint treatment, or with combination metal and paper wings bonded together, not less than 1-1/4" wide and suitable for joint treatment.

GYPSUM WALL BOARD SYSTEM (AND NON-LOAD BEARING METAL STUDS)

2.3 JOINTING SYSTEM

- A. Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this Work.
- B. Jointing compound may be used for finishing if so recommended by its manufacturer.

2.4 FASTENING DEVICES

- A. For fastening gypsum wallboard in place on metal studs and metal channels, use flat head screws, shouldered, specially designed for use with power-driven tools, not less than 1" long, with self-tapping threads and self-drilling points.

2.5 METAL STUDS AND BRIDGING

- A. All framing members shall be manufactured and supplied by Dietrich, ultra-steel framing (where gauge allows) or Dietrich light-gauge steel framing system as required by gauge. or approved equal, of the sizes as shown on the Drawings (where a gauge is not shown on the Drawings, the following applies):
 - (1) 7/8" to 2-1/2" - 25 gauge (CWN) at interior partition framing, 16 gauge structural (CSJ) at all exterior walls/framing. (Any stud "exposed" to the exterior.) 20 gauge, structural at all interior walls with hi-impact/abuse gypsum board.
 - (2) 3-5/8" - 22 gauge (CWN) for interior partition framing, 20 gauge, structural at all interior walls with hi-impact/abuse gypsum board. 18 gauge structural (CSJ) at all exterior walls/framing (any stud "exposed" to the exterior), and 20 gauge for reinforcement at opening framing and ceiling framing.
 - (3) 6" - 22 gauge (CWN) for interior partition framing; 20 gauge, structural at all walls with hi-impact/abuse gypsum board. 6" - 18 gauge structural (CSJ) for exterior wall framing. (Any stud "exposed" to the exterior)
 - (4) 7/8" channels - 25 gauge for ceiling gypsum wallboard attachment. Suspended with 18 gauge galvanized wire.
 - (5) Provide triple studs at jambs of openings.
 - (6) Vertical Slide Clips:
 - a. 20 gage, galvanized steel, channel shaped, attached to structural members or decking, Posi Clip, Fire Trak as manufactured by Total Steel Solutions, 1-877-294-7958, or Dietrich equal product at all fire walls. Deep leg track at non-fire walls.
 - b. Verti Clip, SL, as manufactured by Steel Network, 1-888-474-4876, or Dietrich equal product at all exterior metal stud walls.
 - (7) Shaft wall/horizontal studs at ceiling: USG C-H Studs, 400 CH20-34, or equal.
- B. Bridging:
 - (1) Provide 2-1/2" x 25 gauge channel fastened to each stud, with spacing 5'-0" maximum.
 - (2) When stud length is less than 10'-0", provide 1 row of bridging.
 - (3) When stud length is greater than 10'-0", provide 2 rows of bridging.
- C. Galvanized Materials:
 - (1) All galvanized 18 and 20 gauge studs; all galvanized track, bridging, end closures and accessories shall be formed from steel that corresponds to the requirements of ASTM A446, Grade D with a minimum yield of 33,000 psi.
 - (2) All galvanized 12, 14 and 16 gauge studs and accessories shall be formed from steel that corresponds to the requirements of ASTM A446, Grade D with a minimum yield of 50,000 psi. All galvanized studs, track, bridging and accessories shall be formed from steel having a G-60 galvanized coating meeting the requirements of ASTM A525.

2.6 CONTROL JOINTS

- A. Walls: Provide 093V Expansion Joint by Trim-Tex or equal, at both sides of all door frames and at both sides of all windows within a Gypsum Wall Board wall. Install vertical Control Joints at every 30' O.C., where there is not a door within a gypsum wall board wall length. Install at door jambs, extending from door head to wall's full heights. Coordinate all C.J. locations with Architect even if such is shown on the Drawings.
- B. Walls: Provide mud-on "J" Bead by Trim-Tex or equal at all vertical joint wall abutments (all walls) and at locations noted on the Drawings.
- C. Ceilings: Provide 093V Expansion joint by Trim-Tex, or equal at 10' O.C. in each direction for all GWB ceilings and furr-downs, and/or as shown on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 METAL STUD SYSTEM

- A. General: Install all components as per Dietrich, or other approved manufacturer's instructions for all situations of the installation.
 - 1. Metal stud framing components may be preassembled into panels prior to erecting. Prefabricated panels shall be square, with components attached in a manner to prevent racking.
 - 2. All framing components shall be cut squarely for attachment to perpendicular members, or as required for angular fit against abutting members. Members shall be held positively in place until properly fastened.
 - 3. Provide insulation equal to that specified in Section 072100 in all double jamb studs and all double header members which will not be accessible to the insulation contractor.
- B. Installation:
 - 1. Comply with installation standards of ASTM C754.
 - 2. **ISOLATE STUD SYSTEM FROM TRANSFER OF STRUCTURAL LOADING TO SYSTEM. PROVIDE SLIP OR CUSHIONED TYPE JOINTS TO ATTAIN LATERAL SUPPORT AND AVOID AXIAL LOADING AT ALL STRUCTURAL BEAM-TO-METAL STUD CONNECTIONS OR METAL STUD TO METAL ROOF DECKING CONNECTIONS.**
 - 3. Install runner tracks at floors, ceiling and structural walls and columns where gypsum drywall system abuts other work.
 - 4. Install supplemental framing, blocking and bracing at terminations in the work and for support of fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings and similar work.
 - 5. Comply with manufacturer's recommendations for horizontal bridging for height and gage of studs.

6. Extend interior partition studs, which are not noted to go to underside of decking or other structure, through acoustical or gypsum board ceiling to 6" above ceiling, anchoring using diagonal bracing to the structural system above the ceiling.
7. Space studs at 16" O.C., unless noted otherwise on the Drawings.
8. Ceiling support suspension system shall have main runners at 48" o.c. with space hangers (wire) at 36" o.c. and furring members at 16" o.c.
9. **Install Drywall Track System at base/bottom runner at all rooms as noted in paragraph 2.2.C, above.** (To keep the bottom of the GWB "out of water" on the floor.)

3.4 GYPSUM WALLBOARD

- A. General: Install GWB as per USG, or other approved manufacturer's instructions.
- (1) Install the gypsum wallboard in accordance with the Drawings and with the separate boards in moderate contact but not forced into place.
 - (2) At internal and external corners, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards.
 - (3) Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.
- B. Ceilings and Suspended Ceilings:
- (1) Install the gypsum wallboard to ceiling with the long dimension of the wallboard at right angles to the supporting members.
 - (2) Wallboard may be installed with the long dimension parallel to supporting members that are spaced 16" on centers when attachment members are provided at end joints.
 - (3) Ceilings are to comply with Metal Support Installation Standard: ASTM C754.
- C. Walls:
- (1) Install the gypsum wallboard to studs at right angles to the furring or framing members.
 - (2) Make end joints, where required, over framing or furring members.
- D. **Concrete Slab at floor-to-GWB Joint: Install compressible backer material and sealant at this $\pm \frac{1}{2}$ " gap. Typical at all GWB Walls.**

3.5 JOINT TREATMENT

- A. General:
- (1) Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework.
 - (2) In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and until joint and finishing compounds have dried.
 - (3) Apply the joint treatment and finishing compound by machine or hand tool.
 - (4) Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.
- B. Embedding compounds:
- (1) Apply to gypsum wallboard joints and fastener heads in a thin uniform layer.
 - (2) Spread the compound not less than 3" wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape.
 - (3) After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin layer of compound over the tape.
 - (4) Sand between coats as required.
 - (5) When thoroughly dry, sand to eliminate ridges and high points.

- C. Finishing compounds:
 - (1) After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.
 - (2) Feather the finishing compound to not less than 12" wide.
 - (3) When thoroughly dry, sand to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the wallboard.
- D. **DRYWALL TEXTURE - WALLS , CEILINGS AND HEADWALLS TO RECEIVE PAINT:**
 - 1. **PROVIDE "WALL SPRAY TEXTURE" AS MANUFACTURED BY GOLD BOND, OR EQUAL. TEXTURE TO BE A FINE ORANGE PEEL FINISH. (PROVIDE SAMPLE FOR ARCHITECT'S APPROVAL.)**

3.6 CORNER TREATMENT

- A. Internal corners: Treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.
- B. External corners:
 - (1) Install the specified corner bead, fitting neatly over the corner and securing with the same type fasteners used for installing the wallboard.
 - (2) Space the fasteners approximately 6" on centers, and drive through the wallboard into the framing or furring member.
 - (3) After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8" to 10" on each side of the corner.

3.7 OTHER METAL TRIM

- A. General:
 - (1) The drawings do not purport to show all locations and requirements for all PVC or metal trim.
 - (2) Carefully study the Drawings and the installation, and provide all PVC or metal trim normally recommended by the manufacturer of the gypsum wallboard approved for use in this Work

3.8 CLEANING UP

- A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.
- B. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scrap, debris, and surplus material of this Section.

END OF SECTION

SECTION 095100 - ACOUSTICAL CEILING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide acoustical ceiling where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 092600 - Gypsum Wallboard System

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section:
 - 2. Manufacturer's specifications, installation instructions/drawings and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

1.5 EXTRA STOCK

- A. Deliver to the Owner for his use in future modifications, an extra stock of approximately 5% of each type of acoustical material installed, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Grid System:
 - 1. Lay-in acoustical tile grid system: Prelude XL 15/16" wide - 2' x 2' grid at individual rooms, classrooms and etc. with intermediate duty "T" bars. Color: White, to match acoustical ceiling tile at locations shown on the Drawings.
- B. Acoustical Ceiling Tile:
 - 1. Acoustic Tile "A" - 2' x 2' x 5/8", Armstrong, Fine Fissured #1831, (NRC 0.55), white, or equal. Install at all rooms, where A.C.T. is noted on Drawings.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 INSTALLATION, GENERAL

- A. Except as modified by requirements of governmental agencies having jurisdiction, recommendations of the manufacturer as approved by the Architect, or specific directions of the Architect, install in accordance with ASTM C636 and the pertinent UL design requirements.
- B. Lateral bracing:
 - 1. Provide lateral bracing as required by pertinent codes and regulations.
 - 2. Secure lateral bracing to structural members. Secure at right angles to the direction of the partition and four ways in large ceiling areas.
- C. Provide hold-down clips for ceiling tile when so required by governmental agencies having jurisdiction.
- D. Install all grid level within a tolerance of one in 1000 and straight within a tolerance of one in 1000.
- E. Provide hanger wire at each of the four (4) corners of lay-in troffer lighting fixtures.
- F. Coordinate all ceiling heights with all wall-mounted (cabinets, etc..) equipment.

3.4 INSTALLATION OF ACOUSTICAL MATERIALS

- A. "T" grid system: If acoustical ceiling tile has linearity of pattern, install facing as directed by Architect.

3.5 CLEANING

- A. In addition to other stipulated requirements for cleaning, completely remove finger prints and traces of soil from the surfaces of grid and acoustical materials, using only those cleaning materials recommended for the purpose by the manufacturer of the material being cleaned.

END OF SECTION

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide resilient flooring and accessories where shown on the Drawings, as specified herein, and as needed for complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen, manufacturer, and supplier who are thoroughly trained and experienced, with at least five (5) years experience with all products of this sections, and in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 23.
- B. Product data: submit;
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Samples of each item, color, and pattern available in the specified grades from the proposed manufacturers.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01 64 00.

1.5 EXTRA STOCK

- A. Deliver to the Owner for his use in future modifications an extra stock of approximately 5% of each color and pattern in each material installed under this Section, packaging each type of material separately, clearly marked with item identification, and adequately protected against deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Provide colors and patterns as specified in this Section and as per the Drawings.**
- B. Adhesives: Provide waterproof and stabilized adhesive as recommended by the manufacturer of the material being installed. Asphaltic emulsions and other non-waterproof adhesives will not be acceptable.
 - 1. Luxury Vinyl Tile - as recommended by manufacturer
 - 2. Sheet vinyl - as recommended by manufacturer
 - 3. Rubber base - as recommended by manufacturer
- C. Concrete slab primer: Provide non-staining type as required and as recommended by the manufacturer of the material being installed.

2.2 RESILIENT MATERIALS

- A. Rubber Base:
 - 1. 4.5" x .375" Thick, Mandalay Rubber Cove Base, by Tarkett, or equal, with site mitered external and internal corners. Continuous lengths to be used, 4' sections will not be accepted. Colors: to be selected by Architect and/or Owner from manufacturer's standard colors. "Black/Brown" color is anticipated.
- B. Luxury Vinyl Tile: (LVT on Drawings)
 - 1. LVT #1 (Wood Look): J&J Flooring Group, classics, or equal. Color to be selected by Architect from manufacturer's standard colors.
 - 2. J&J contact: Brad Bunch, 479-305-4004.
- C. Rubber Flooring Transitions:
 - 1. Solid rubber edge strip matching color range of resilient flooring and carpet, profile(s) as required by conditions. Profile(s) and color(s) to be selected by Architect from manufacturer's standard profile and color line.
 - 2. **Reducer strips to be used at transition of all dissimilar flooring materials, edges or termination points. (Such as LVT-to-Concrete, LVT-to-Carpet, and etc.)**

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION: Perform testing as stated below.

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers and hardeners.
 - 2. 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. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform one (or both if one fails) tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/100 SF (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 1869. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement. Notify Architect/Designer of results.
 - c. Fill cracks, holes and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

- d. Do not install floor coverings until they are the same temperature as space where they are to be installed.
 - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- e. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 INSTALLATION

- A. General:
 - 1. Install materials only after finishing operations, including painting, have been completed and after permanent heating system is operating.
 - 2. Verify that moisture content of concrete slabs, building air temperature, and relative humidity are within the limits recommended by the manufacturer(s) of the materials used.
 - 3. Maintain reference markers, holes, and openings that are in place or plainly marked for future cutting by repeating on the finish surface as marked in the subfloor. Use chalk or other non-permanent marking device.
 - 4. Install as per layout plan shown on the Drawings.
 - 5. Install each material per the manufacturer's recommendations.
- B. Installing All Materials / Products of this Section: Install in strict accordance with manufacturer's written instructions.
- C. Installing base:
 - 1. Install base where scheduled on the Drawings.
 - 2. Miter cut both field-formed external and internal corners.

3.4 CLEANING AND PROTECTING

- A. Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

END OF SECTION

SECTION 097720 – FIBERGLASS REINFORCED WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
 - 1. Aluminum trim.
 - 2. PVC Wall base.
- B. Products Not Furnished or Installed under This Section:
 - 1. Gypsum substrate board.
 - 2. Resilient Base.

1.2 RELATED SECTIONS

- A. Section 092600 – Gypsum wall board system and metal studs.

1.3 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.

1.4 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. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- D. 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.
 - 3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives and sealants prior to their delivery to the site.

1.5 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - 1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
 - a. 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.
 - 3. Canadian Food Inspection Agency (CFIA) requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°) for 48 hours prior to installation.

1.7 PROJECT CONDITIONS

- A. 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
- B. 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.
 - 1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.8 WARRANTY

- A. Furnish one year guarantee against defects in material and workmanship.

PART 2 - PRODUCTS (NOTED "FRP-1" and "FRP-2" on Drawings)

2.1 ACCEPTABLE MANUFACTURER

- A. Marlites, NUDO, or other approved manufacturer and product.
- B. Product:
 - 1. STANDARD FRP at walls Noted "FRP" on the Drawings. (Typically, at walls at Restroom and South Hall.)

2.2 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 - 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 - 2. Dimensions:
 - a. Thickness – 0.090 inch (2.29mm) nominal, without plywood at "FRP-2". FRP on 3/8" OSB at "FRP-1"
 - b. Width - 4'-0" (1.22m) nominal
 - c. Length – 8'-0" (2.4m) nominal

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

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.

- 1. Flexural Strength - 1.0×10^4 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
- 2. Flexural Modulus - 3.1×10^5 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
- 3. Tensile Strength - 7.0×10^3 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
- 4. Tensile Modulus - 1.6×10^5 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
- 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

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: As Indicated below

- 1. Color: Architect to choose from manufacturer's standard selections
- 2. Fire Rating Class A (I)

2.3 MOLDINGS

A. Aluminum Trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory.

- 1. Finish: Factory oven-baked finish.
- 2. Profiles : (Provide all profiles as required for a complete installation)
 - a. F 550 Inside Corner
 - b. F 561 Outside Corner
 - c. F 565 Division
 - d. F 570 Edge
 - e. A551 Inside Corner.
 - f. A560 Outside Corner
 - g. A565 Division
 - h. A570 Edge
- 3. Color: to be selected by Architect and/or Owner from Manufacturer's standards.

2.4 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.

- 1. Match panel colors.
- 2. Length to suit project conditions.

B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.

- 1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive
- 2. Marlite C-375 Construction adhesive flexible, water-resistant, solvent based adhesive formulated for fast, easy application.

C. Sealant:

- 1. Marlite Brand or NUDO - Color Match Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
 - 1. Verify that stud spacing does not exceed 24 inch (61cm) on-center.
- B. Repair defects prior to installation.
 - 1. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.2 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.

3.3 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.

3.4 EXTRA STOCK

- A. Provide 5% of each material used as extra stock.

END OF SECTION

SECTION 099000 - PAINT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Paint and finish the exterior and interior exposed surfaces listed on the Painting Schedule in Part 3 of this Section, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
 - 2. Priming or priming and finishing of certain surfaces may be specified to be factory-performed or installer performed under pertinent other Sections.
 - 3. Section 321313 - Concrete Paving and Pavement Marking
 - 4. Section 055000 - Metal Fabrications
 - 5. Section 081000 - Metal Doors and Frames
 - 6. Section 092600 - Gypsum Wallboard System and Non-Load Bearing Metal Studs
- C. Work not included:
 - 1. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.
 - 2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section except where indicated.
 - 3. Do not paint moving parts of operating units; mechanical or electrical parts such as valve operators; linkages, sensing devices; and motor shafts, unless otherwise indicated.
 - 4. Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates, including labels on fire-rated doors.
 - 5. Do not paint concrete which has been sandblasted.
 - 6. Do not paint rubber door silencers at hollow metal frames.
- D. Definitions:
 - 1. "Paint," as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Paint coordination:
 - 1. Provide finish coats which are compatible with the prime coats actually used.
 - 2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
 - 3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
 - 4. Provide barrier coats over incompatible primers, or remove the primer and reprime as required.
 - 5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data:
 - 1. Materials list of items proposed to be provided under this Section, referenced to the Painting Schedules.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's complete color samples for both interior and exterior stains and paints.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

1.5 JOB CONDITIONS

- A. Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degrees F, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.
- B. Weather conditions:
 - 1. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect.
 - 2. Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application and drying periods.

1.6 EXTRA STOCK

- A. Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 5% of each color, type, and gloss of paint used in the Work, tightly sealing each container, and clearly labeling with contents and location where used.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

- A. Acceptable materials:
 - 1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - a. Glidden Coatings and Resins, Division of SCM Corporation (Glidden)
 - b. Benjamin Moore and Co. (Moore)
 - c. Polomylx Industries, Inc.
 - d. PPG Industries, Pittsburgh Paints (Pittsburgh)
 - e. The Sherwin-Williams Company (S-W)
 - f. Scuffmaster
- B. Undercoats and thinners:
 - 1. Provide undercoat paint produced by the same manufacturer as the finish coat.
 - 2. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.

3. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2.2 COLOR SCHEDULE

- A. Architect and/or Owner will prepare a color schedule, for all interior and exterior walls and etc., during the first 60 days of the construction schedule.**
- B. The Architect may select, allocate, and vary colors on different surfaces throughout the Work, subject to the following:
 1. Exterior work: A maximum of five (5) different colors will be used, with variations for trim, doors, miscellaneous work, and metal work.
 2. Interior work: A maximum of five (5) different colors will be used, with variations for trim, doors, miscellaneous work, and metal work.

2.3 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 MATERIALS PREPARATION

- A. General:
 1. Mix and prepare paint materials in strict accordance with the manufacturers' recommendations as approved by the Architect.

2. When materials are not in use, store in tightly covered containers.
3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign material and residue.

B. Stirring:

1. Stir materials before application, producing a mixture of uniform density.
2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.

3.4 SURFACE PREPARATION

A. General:

1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations as approved by the Architect.
2. Remove removable items which are in place and are not scheduled to receive paint finish; or provide surface-applied protection prior to surface preparation and painting operations.
3. Following completion of painting in each space or area, reinstall the removed items by using workmen who are skilled in the necessary trades.
4. Clean each surface to be painted prior to applying paint or surface treatment.
5. Remove oil and grease with clean cloths and cleaning solvent of low toxicity and flash point in excess of 200 degrees F, prior to start of mechanical cleaning.
6. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

B. Preparation of wood surfaces:

1. Clean wood surfaces until free from dirt, oil, and other foreign substance.
2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.

C. Preparation of metal surfaces:

1. Thoroughly clean surfaces until free from dirt, oil, and grease.
2. On galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with phosphoric acid etch. Remove etching solution completely before proceeding.
3. Allow to dry thoroughly before application of paint.

3.5 PAINT APPLICATION

A. General:

1. Touch up shop-applied prime coats which have been damaged, and touch up bare areas prior to start of finish coats application.
2. Slightly vary the color of succeeding coats.
 - a. Do not apply additional coats until the completed coat has been inspected and approved.
 - b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five feet.
4. On removable panels and hinged panels, paint the back sides to match the exposed sides.

B. Drying:

1. Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.

2. Consider oil-base and oleo-resinous solvent-type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Brush applications:
1. Brush out and work the brush coats onto the surface in an even film.
 2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.
- D. Spray application:
1. Except as specifically otherwise approved by the Architect, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
 2. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
 3. Do not double back with spray equipment to build up film thickness of two coats in one pass.
- E. Miscellaneous surfaces and procedures:
1. Exposed mechanical items:
 - a. Finish electric panels, access doors, conduits, pipes, ducts, grilles, registers, vents, and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
 - b. Paint visible duct surfaces behind vents, registers, and grilles flat black.
 - c. Wash metal with solvent, prime, and apply two coats of alkyd enamel.
 2. Exposed pipe and duct insulation:
 - a. Apply one coat of latex paint on insulation which has been sized or primed under other Sections; apply two coats on such surfaces when unprepared.
 - b. Match color of adjacent surfaces.
 - c. Remove band before painting, and replace after painting.
 3. Hardware: Paint prime coated hardware to match adjacent surfaces.
 4. Wet areas:
 - a. In toilet rooms and contiguous areas, add an approved fungicide to paints.
 - b. For oil based paints, use 1% phenolmercuric or 4% tetrachlorophenol.
 - c. For water emulsion and glue size surfaces, use 4% sodium tetrachlorophenate.
 5. Interior: Use "stipple" finish where enamel is specified.
 6. Exposed vents: Apply two coats of heat-resistant paint approved by the Architect.
- F. Identification of Fire Rated Partitions:
1. **As described in the Arkansas Fire Prevention Code, Para. 702.1.5, corridor partitions, smoke stop partitions, horizontal exit partitions, exit enclosures and fire rated walls shall be permanently identified as to the rated integrity of described wall. All interior partitions noted as smoke and fire rated walls on the Drawings shall have the following identification, at the Contractor's option:**
 - a. **Permanently affixed signs constructed of a permanent material such as plastic or metal with 2" minimum height lettering contrasting with the signage background. Signage shall have the following text (or approved equivalent):**
FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS
Signage shall be located at approximately 15 foot intervals, and must occur at least once between demarcating walls (for example along a 12 foot wall separating an office from an egress corridor.
 - b. **A rectangular painted background with contrasting stenciled lettering, such as red lettering on a white rectangle may be used in lieu of permanent signage at the Contractor's option.**

3.6 EXTERIOR PAINTING SCHEDULE

- A. Provide the following finishes with materials manufactured by Sherwin-Williams or equal products by manufacturers listed in 2.1, A.1 of this Section. **ALL FACTORY PRIMED MATERIALS MUST ALSO RECEIVE AN "AT THE JOB SITE" PRIME COAT.**
- B. Gypsum Wallboard (Soffits, Ceilings)
 - 1. Painted (Flat Finish / Alkyd Base) 420 Color Answers Colors
 - a. 1st coat: A-100 Latex Satin, A82 Series (4.0 mils wet, 1.5 mils dry)
 - b. 2nd coat: A-100 Latex Satin, A82 Series (4.0 mils wet, 1.5 mils dry)
- C. Ferrous Metal (Misc. Steel, Doors and Frames, Handrails and Bollards)
 - 1. Painted (Gloss Finish / Alkyd Base) Wide Range of Color
 - a. 1st coat: Kromik Primer, E41N1 (5.0 mils wet, 3.0 mils dry)
 - b. 2nd coat: Industrial Enamel, B54 (5.0 mils wet, 2.0 mils dry)
 - c. 3rd coat: Industrial Enamel, B54 (5.0 mils wet, 2.0 mils dry)
- D. Concrete Walls (where noted "Paint")
 - 1. Painted (Flat Finish)
 - a. 1st coat: Thoro, Chemrex, Thorocoat Tex
 - b. 2nd coat: Thoro, Chemrex, Thorocoat Tex
- E. Traffic Line Marking (Concrete Curbs, New and Existing Asphalt)
 - 1. Refer to Section 3214313 - Concrete Paving and Markings.

3.7 INTERIOR PAINTING SCHEDULE - It is anticipated that there will be 3 wall colors, a door frame color and a color for the exposed structural steel. However, final color selections and locations will occur during construction and more colors at various locations is possible.

- A. Provide the following finishes with materials manufactured by Sherwin-Williams or equal products by manufacturers listed in 2.1, A.1 of this Section. **ALL FACTORY PRIMED MATERIALS MUST ALSO RECEIVE A FIELD APPLICATION OF PRIME COAT. (STEEL MATERIALS IN PARTICULAR.)**
- B. Wood and Plywood: Doors, Cabinetry and Miscellaneous Trim noted "Stain" on Drawings.
 - 1. Stained and Varnished (Clear Finish)
 - a. Open Grained Wood (Hardwood)
 - 1) 1st coat: Interior Wood Stain, A48
 - 2) 2nd coat: Sherwood 100 Fast Dri Semi-Paste Filler D70T1
 - 3) 3rd coat: Oil Base Satin Varnish, A66F90
 - 4) 4th coat: Oil Base Satin Varnish, A66F90
- C. Wood and Plywood: Miscellaneous Trim and Doors noted "Paint" on Drawings
 - 1. Painted (Semi-Gloss Finish/Alkyd Base) Color Answers: Interior
 - a. 1st coat: ProMar Classic Latex Primer
 - b. 2nd coat: ProMar 200 Interior Alkyd Semi-Gloss
 - c. 3rd coat: ProMar 200 Interior Alkyd Semi-Gloss
- D. Gypsum Wallboard and Plaster: Walls (Not at Restrooms, Mechanical or Janitor Rooms)
 - 1. Painted (SEMI-GLOSS FINISH/Alkyd Base) Color Answers: Interior
 - a. 1st coat: ProMar 200 Latex Wall Primer, B28W200 (4.0 mils wet, 1.4 mils dry)
 - b. 2nd coat: ProMar 200 Alkyd Semi-Gloss Enamel, B33 (4.0 mils wet, 2.0 mils dry)
 - c. 3rd coat: ProMar 200 Alkyd Semi-Gloss Enamel, B33 (4.0 mils wet, 2.0 mils dry)

Note: All new gypsum board walls, ceilings, furr-downs, headwalls and all exposed gypsum board are to receive gypsum "Wall Spray Texture" as manufactured by Gold Bond, or equal. Texture to be a fine orange peel.

- E. Gypsum Wallboard: Ceilings
 - 1. Painted (Flat Finish / Latex Base) Color Answers: Interior
 - a. 1st coat: ProMar 200 Latex Wall Primer, B28W200 (4.0 mils wet, 1.4 mils dry)
 - b. 2nd coat: ProMar 200 Latex Wall Paint B30W200 (4.0 mils wet, 1.4 mils dry)
 - c. 3rd coat: ProMar 200 Latex Wall Paint B30W200 (4.0 mils wet, 1.4 mils dry)
- F. Gypsum Wallboard Walls - At Restrooms, Mechanical, or Janitor rooms
 - 1. Painted (Gloss Finish / Acrylic Epoxy) Wide Range of Color
 - a. 1st coat: ProMar 200 Latex Wall Primer, B28W200 (4.0 mils wet, 1.4 mils dry)
 - b. 2nd coat: Water Based Catalyzed Epoxy, B70/B60V15 (8.0 mils wet, 3.0 mils dry)
 - c. 3rd coat: Water Based Catalyzed Epoxy, B70/B60V15 (8.0 mils wet, 3.0 mils dry)
- G. Ferrous Metal (Hollow Metal Frames; Misc. Metal, Structural Steel)
 - 1. Painted (Semi-Gloss Finish / Alkyd Base) Color Answers: Interior
 - a. 1st coat: Kem Kromik Metal Primer, B50N2/B50W1 (8.0 mils wet, 3.0 mils dry)
 - b. 2nd coat: ProMar 200 Alkyd Semi-Gloss, B34W200 (4.0 mils wet, 2.0 mils dry)
 - c. 3rd coat: ProMar 200 Alkyd Semi-Gloss, B34W200 (4.0 mils wet, 2.0 mils dry).

END OF SECTION

SECTION 105300 - PROTECTIVE COVERS (ALUMINUM CANOPIES)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work shall include the furnishing and installation of an extruded aluminum overhead supported structure (building supported canopy) as shown in the Drawing and the Drawing following this Section. The work shall include, but is not limited to:
 - 1. Decking
 - 2. Fascia/Gutter
 - 3. Anchors
 - 4. Supports
 - 5. Beams
 - 6. Wall Flashing
- B. Related work:
 - 1. Section 055000 – Metal Fabrication

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Manufacturer: Shall have a minimum of ten (10) years experience in the manufacturing and supply of
- C. Installer: Shall have a minimum of five (5) years experience installing pre-engineered aluminum/steel
- D. Design of the overhead structure shall be in accordance with applicable local building codes and certified

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013323.
- B. Product data: submit:
 - 1. **Materials list of items proposed to be provided under this section;**
 - 2. **Manufacturer's specifications literature, details and other data needed to prove compliance with the**
 - 3. **Actual color and material samples from manufacturer's standard color and material lines.**
 - 4. **Manufacturer's recommended installation procedures which, when approved by the Architect, will**
 - 5. **Provide shop drawings which clearly illustrate all materials fabrication, layout and installation details.**
 - All shop drawings shall be signed and sealed by a registered Professional engineer, licensed in Arkansas**
 - a. Prior to developing the shop drawings verify and/or confirm all dimensions shown on the Drawings by taking field measurements to insure proper fit, alignment and attachment of all component parts.**

1.4 COORDINATION

- A. Provide necessary anchors, blockouts, flashing and other items required to be built in ample time to avoid

1.5 PRODUCT REQUIREMENTS AND HANDLING

- A. Comply with pertinent provisions of Sections 016000 and 016400.

- B. Deliver and store all items in protected areas. Keep free of any damage. Replace any damaged items or

1.6 DESIGN PARAMETERS

- A. Live load design requirements of the IBC as required of the canopy for this project's location of the overhead structures shall be no less than 20 p.s.f. Overhead Structures shall comply in all respects with Southern Building Code Congress International requirements for the floor, wall and roof systems.

PART 2 - MATERIALS AND PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Subject to compliance with requirements herein, produce product manufactured Superior Metal Products, 877-445-1200, www.smp.com, Birmingham, AL, or approved equal.

2.2 PRODUCTS AND MATERIALS: **SEE PHOTOS WHICH FOLLOW THIS SECTION FOR SIMILAR, NOT EXACT, CANOPIES REQUIRED FOR THIS PROJECT, AND SEE DRAWINGS.**

- A. Decking: Decking panels shall be extruded aluminum "Flush Decking" / "Flat Pan" 12" x 3" flat pan, wall thickness of .075" min to span dimensions shown on the plans. They shall interlock to provide a weather-tight, load-bearing structure. Finish shall be electrostatically applied, baked-on, high solid, polyester paint, selected from manufacturer's standard colors. (Kynar 500)
- B. Fascia/Gutter: Extruded Aluminum Full perimeter fascia/gutters shall be extruded aluminum and shall be 8" in height and 3" in depth. Minimum thickness to be .094". An integral water gutter shall be incorporated with a cross-sectional area of not less than 10-1/2 square inches. Finish shall be electrostatically applied, baked on, high solid, polyester paint, Kynar 500, selected from manufacturer's standard colors.
- C. Overhead Supports shall be tubular heavy-duty as depicted on the Drawing following this Section.
- E. Abutment to Wall Flashing: Fascia gutter at wall shall be with aluminum coil flashing and saw cut into exterior masonry, sealed with sealant to be weathertight.
- F. Fasteners and anchorage components: as recommended, designed and provided by manufacturer for the shown design. Use heavy duty overhead support.
- G. See Drawing which follow this Section for similar design. Designs/Dimensions shown on Drawings take precedence.
- H. Misc: 3/8" diameter stainless steel bolts, nuts, washers and screws, and other materials as required for a complete installation.

PART 3 - INSTALLATION AND ERECTION

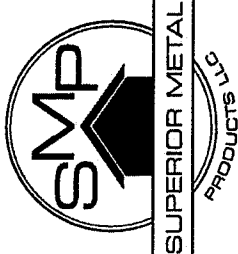
3.1 ERECTION

- A. General: Overhead structures (canopy) shall be installed in strict accordance with manufacturer's instructions, approved plans and shop drawings, and the entire structure shall be erected straight, true, and plumb in accord with standard construction procedures. All joints and connections shall be tight and clean and all surfaces of work left in a clean condition.

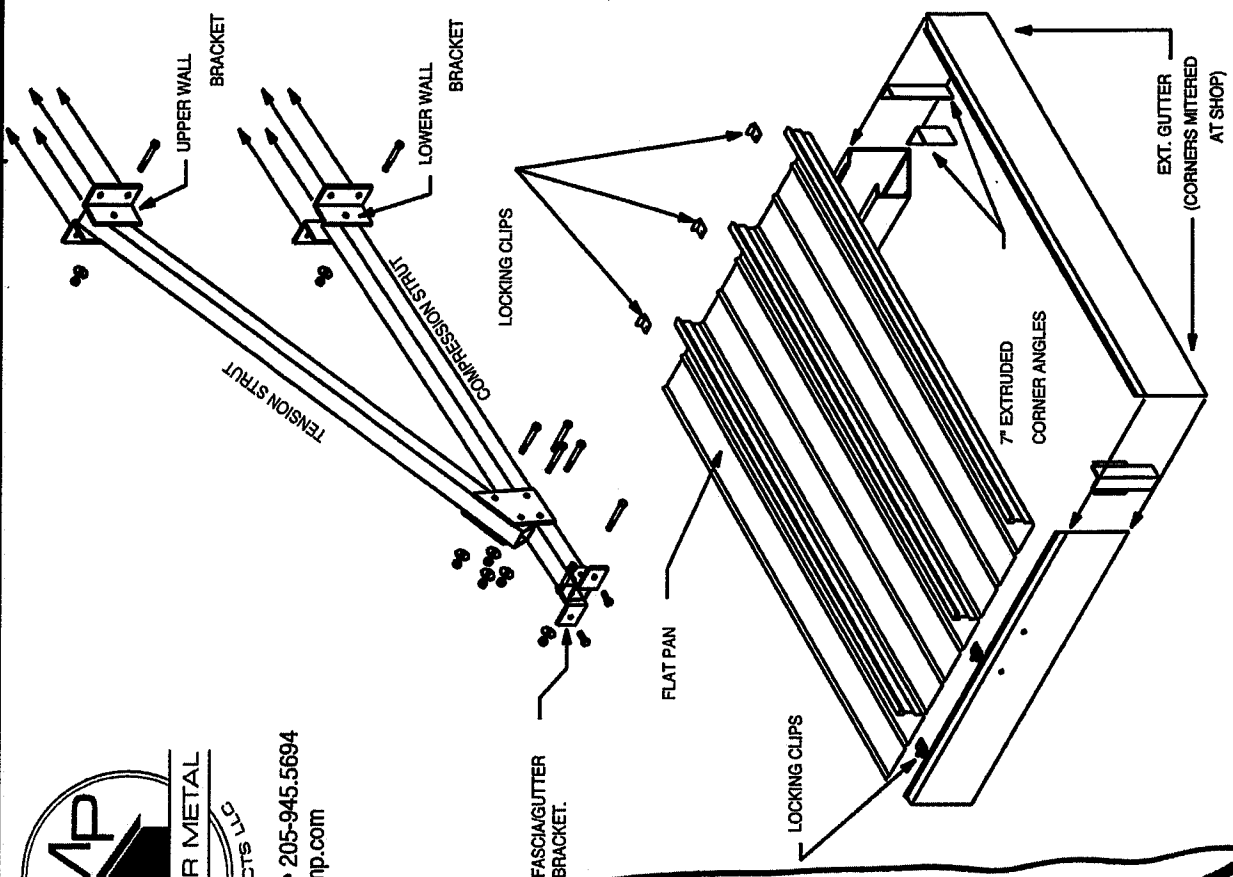
3.2 ADJUSTING AND CLEANING

- A. Clean site and remove all excess material.
- B. Clean all surfaces and touch-up paint any and all scratches or abrasions in pre-finished materials so as to be completely invisible to the unaided eye from a distance of five feet.
- C. Replace components that are damaged beyond repair.

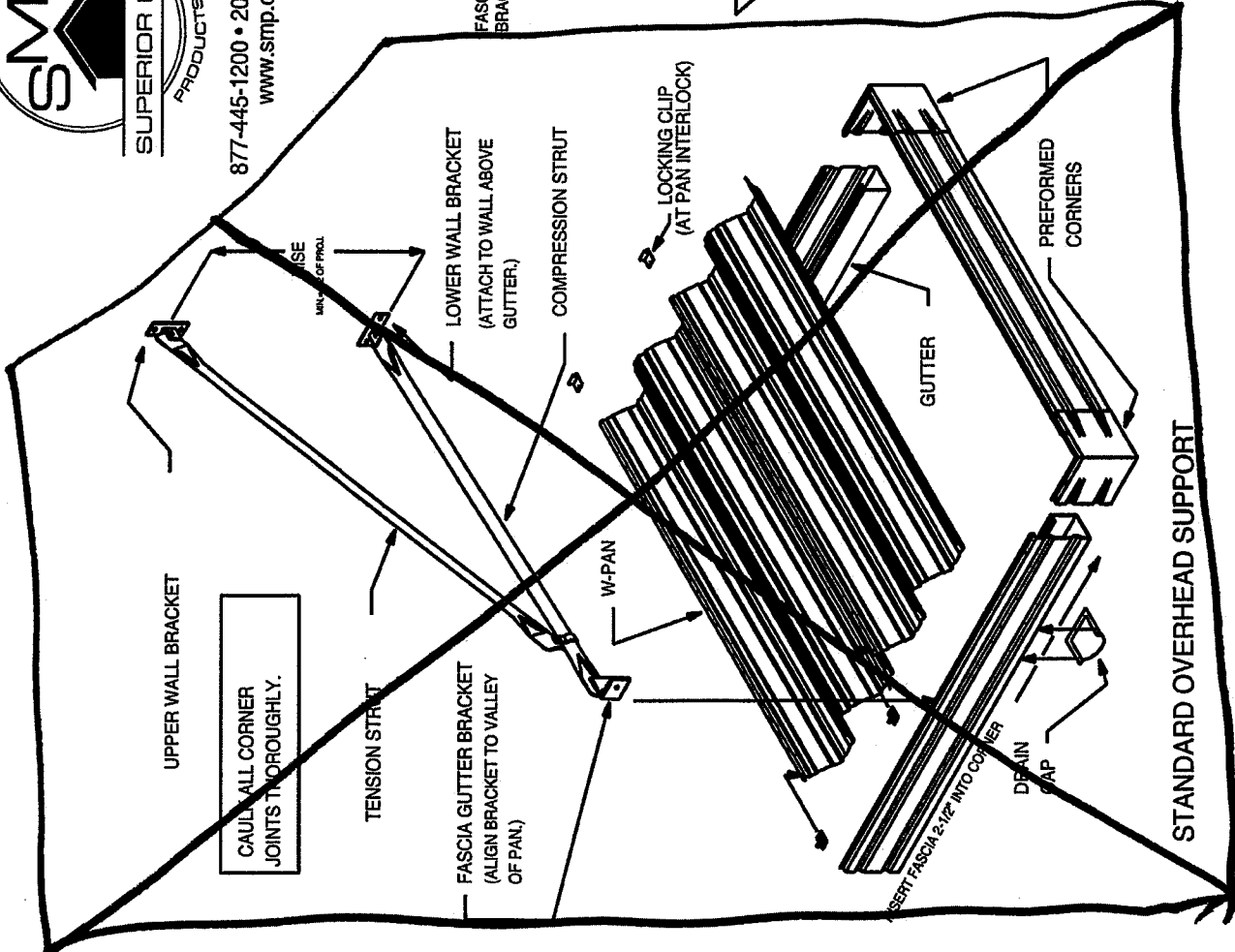
END OF SECTION



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HEAVY-DUTY OVERHEAD SUPPORT



STANDARD OVERHEAD SUPPORT

SECTION 109000 - MISCELLANEOUS SPECIALTIES

1PART - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide miscellaneous specialty items where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
 - 1. Fire Extinguishers (and cabinets)
 - 2. Building Signage
 - 3. Corner Guard
 - 4. Toilet Accessories
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINETS AND FIRE EXTINGUISHERS

- A. Where noted "FEC" on Floor Plan, J.L. Industries, (or equal) Panorama 1036 P42, Fire-FX fire rated tub option, recessed steel cabinet, satin finish aluminum trim with Cosmic Extinguisher, 10E. (Mount bottom of cabinet at 2'-6" above finished floor.)
- B. Where noted "FE" on Floor Plan, install J.L. Industries Cosmic Extinguisher 10E, with wall mounting bracket and holding strap.

2.2 BUILDING SIGNAGE ("IDENTIFYING DEVICES")

- A. The Architect will select and advise Contractor of exterior and interior building signage, as scheduled below.
 - 1. Interior:
 - a. Changeable Message Signs, 6" x 6" x 1/8" MP Plastic with two windows below text as manufactured by Best Sign Systems, or equal. There shall be one sign at each room shown on the Overall Architectural Floor Plan. Provide signs at each door into a room, if room has more than one door. Color to be selected from manufacturer's standard "MP" color chart.
 - 2. Exterior
 - a. Handicapped and Department of Transportation (DOT) traffic signs at each HC parking space, and/or as shown on the Drawings: Sign post are to be steel tubes, factory painted. Size of posts and heights of signs are as indicated on the drawings. Sign face background is 0.063 inch aluminum plate, cut to size and attached to sign post with non-corrosive 3/8" machine bolts with washers, two per sign.

2.3 CORNER GUARDS

- A. At locations noted "C.G." on Floor Plan, Pawling Style CG-18, clear Lexan with 2-1/2" x 2-1/2" wings. Install from top of wall base to 4 feet above finished floor. **If not noted on the Floor Plan Drawings, then install at all "outside" corners which are gypsum wallboard (painted).**

2.4 TOILET AND CLOSET ACCESSORIES

- A. Provide items per the following schedule, as manufactured by Bobrick or approved equal. Mount at heights shown. Heights shown are to bottom of item. "HC" denotes handicapped accessibility.
- B. **Legend: Accessory / Abbreviation (See Drawings for Mounting Heights and Quantities)**
1. B-2888 - Toilet Tissue Dispenser / "TP"
 2. B-4262 - Paper Towel Dispenser / "PT"
 3. B165 - Framed Mirror, 18" x 36" / "M"
 4. B6106.99 - Grab Bars, 36" length, 48" length, and 18" length / "GB" (34")
 5. B223x24 - Mop and Broom Holder / "MH" (60")
 6. Coat Hook: B-211 / "RH" (60")

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION AND CLEANING

- A. Install and clean all materials in this Section in strict accordance with each manufacturer's written instructions.

END OF SECTION

SECTION 133419 - PRE-ENGINEERED METAL BUILDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provide pre-engineered metal building system as shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 033000 - Cast-in-Place Concrete

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Design Criteria:
 - 1. For structural steel members, comply with AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."
 - 2. For light gage steel members, comply with AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
 - 3. Design primary and secondary members and covering for applicable loads and combination of loads in accordance with Metal Building Manufacturer's Association (MBMA) "Recommended Design Practices Manual."
 - 4. For welded connections, comply with AWS "Structural Welding Code."
 - 5. Design Loads: Structural design shall conform to the 2012 Arkansas Fire Prevention Code, with the following exceptions:
 - a. Structural members shall be designed for a minimum 20 pounds per square foot and no live load reduction shall be made because of tributary roof area supported by any member. Structural members shall be designed for a minimum wind load of 20 pounds per square foot and seismic Zone I.
 - b. The combination of loads and probability factors used in design shall conform to the requirements of Section 4 of the American National Standards Institute, Inc. "American National Standard Building Code Requirements for Minimum Design Loads in Buildings and Other Structures", A58.1 -1972.
 - 6. The purlins and frames shall be designed utilizing a separate bracing system for lateral support.
 - 7. Fabrication Criteria: Provide prefabricated metal buildings as produced by a manufacturer who is regularly engaged in fabrication and erection of pre-engineered metal structure of type and quality indicated.

1.3 MANUFACTURERS QUALIFICATIONS

- A. Approval by Architect is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
- B. Manufacturer regularly and presently manufactures pre-engineered metal buildings as specified as one of its principal products.
- C. Installer has technical qualifications, experience, trained personnel and facilities to install specified items. Approval will not be given, however, where experience record is one of unsatisfactory performance.
- D. Manufacturer's product submitted has been in satisfactory and efficient operation on three installations similar and

equivalent to this project for three years. Submit list of installations.

1.4 SUBMITTALS

- A. Comply with pertinent provision of Section 013400, Submittals and Substitutions.
- B. Product Data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect will become the basis for accepting or rejecting actual installation procedure used on the work.
 - 4. Shop Drawings: Submit complete erection drawings showing anchor bolt settings, sidewall, end wall, and roof framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components. Submit one reproducible copy and five blackline copies.
 - 5. Certification: Submit written Certification prepared and signed by a Professional Engineer, registered to practice in the State where building is to be erected, verifying that building design meets indicated loading requirements.
 - 6. Samples: Submit samples of the following. Architect's review will be for color and texture only. Compliance with other requirements is responsibility of Contractor.
 - a. Color samples of roofing and siding panels, with required finishes.

1.5 PRODUCT HANDLING

- A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight, ventilated covering. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.6 WARRANTY

- A. Metal roof and wall system manufacturer, upon final acceptance of the work, furnish a warranty covering paint finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty (20) years for panels coated with premium fluorocarbon coating produced with Kynar 500 or Hylar 500 resin.
- B. Weathertightness warranty by the roofing manufacturer, for a period of twenty (20) years. Roofing manufacturer shall have sole and exclusive obligation for all warranty work. The total liability of the roofing manufacturer is two (2) times the cost of the roofing manufacturer's roofing system as invoiced to roofing manufacturer's customer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General:
 - 1. Extent of pre-engineered building work is shown on Drawings.
 - 2. Type is continuous beam metal building of nominal width, length, wall height and roof pitch indicated.
 - 3. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements.
 - 4. Concrete floor and foundations and installation of anchor bolts are specified in Division 3.
- B. Building System:
 - 1. The pre-engineered building is to meet the performance requirements for the proposed manufacturer and their design criteria.
 - 2. The outline of materials is to meet the following metal building systems specifications:

- a. Structural steel plate, bar, sheet and/or strip intended for use in bolted and/or welded constructions generally shall be of material based on the requirements of ASTM A572, and have a minimum yield strength of 50,000 psi.
- b. Structural steel material intended for use in roll formed or press broken secondary structural members generally shall be of material based on the requirements of ASTM A570, and have a minimum yield strength of 55,000 psi.
- c. Galvanized steel coil used in roll formed or press broken roof and wall coverings, trim and flashings generally shall be material based on the requirements of ASTM A446, and have a minimum yield strength of 50,000 psi.
- d. Galvalume steel coil used in roll formed or press broken roof covering generally shall be material based on the requirements of ASTM A792, and have a minimum yield strength of 50,000 psi.
- e. Primary Framing:
 - 1) Continuous Beam ("CB" Series) solid web framing shall utilize tapered or uniform depth beams or girders supported on uniform or tapered depth columns. The frame shall not utilize interior columns and be designed to support loads at bay spacings as detailed.
 - 2) Post & Beam solid web framing shall be primary load carrying members at the end walls of the buildings.
- f. Secondary Framing members shall be the structural members which carry loads to the primary framing members. They shall consist of eave members, roof purlins, transbay members, wind struts, wind bracing, wall girts and other miscellaneous structural framing and be either welded built-up sections, cold-formed light gage shapes, open web members and/or hot-rolled shapes.
- g. Fabrication
 - 1) Structural members shall be fabricated by methods of shearing, forming, punching, welding, flame cutting, drilling, reaming, etc. in accordance with manufacturer's standard practices.
 - 2) Structural members of welded plate sections shall have the flanges and webs joined by a continuous automatic submerged arc welding process. Shop welding shall be performed by certified welders.
 - 3) Shop connections shall normally be welded. Field connections shall normally be bolted using A325 or A307 bolts in punched, drilled, or reamed holes, in accordance with manufacturer's standard practices.
 - 4) Workmanship and fabrication tolerances shall be in accordance with manufacturer's quality control standards.
- h. Shop Primer
 - 1) All structural steel members shall be cleaned of oil, dirt, loose scale and foreign matter prior to receiving one shop coat of manufacturer's standard primer paint.
 - 2) Shop primer paint shall be a rust inhibitive primer paint which meets or exceeds performance requirements of Federal Specification TTP 664c and is compatible in color to the color of the finish coat.
- i. Building systems are to be erected in accordance with appropriate erection drawings, erection guides and/or other erection documents furnished by manufacturer. It is the responsibility of the erector to comply with all appropriate legal and safety requirements. It is the further responsibility of the erector to determine and provide any and all temporary bracing, shoring, blocking, bridging and/or securing of components, etc. as required during the erection process.
- j. **ROOF COVERING SYSTEMS: FIELD VERIFY FOR NEW PANELS TO MATCH EXISTING; MODIFY THE INFORMATION BELOW ACCORDINGLY. NOTIFY THE ARCHITECT OF ANY NEEDED MODIFICATIONS.**
 - 1) The Roof Covering System shall consist of the exterior roof panels, panel attachments, roof accessories, Ridge Cap, sealants, mastics, trim and flashings as required.
 - 2) Roof Systems shall consist of Standing Seam MBCI, ULTRA-DEK, 24" X 3" roof system, or equal, which has concealed high sliding clip fasteners. Sealants, mastics closures, trim and/or flashings necessary to provide weathertightness and/or finished appearance.
 - 3) Roof Panels shall provide 24" minimum (36" preferred) wide net coverage. All panels shall be continuous from eave to ridge except where the panel length exceeds 41' or otherwise becomes prohibitive for handling purposes, in which case, endlaps shall be provided. Endlaps shall be 7" and occur over the supporting member.

- 4) Sealants, mastics and closures shall be manufacturer's standards. They shall be provided at panel endlaps, sidelaps, rake, eave, transitions and accessories as required to provide a weather resistant roof system.
- 5) Roof panel-to-roof purlin structural attachments shall be made with exposed fasteners, to be self-drilling, stainless steel-capped with integral sealing washer. Color of fastener heads shall match the roof panel finish. Location and quantities of fasteners shall be manufacturer's standards based upon building design, weathertightness, and/or finished appearance.
- 6) Roof panel gauge: 24 gauge zinc aluminum coated steel.
- 7) Finish to be Kynar 500 with color matching existing.
- k. **WALL COVERING SYSTEM: FIELD VERIFY FOR NEW PANELS TO MATCH EXISTING AND MODIFY THE INFORMATION BELOW ACCORDINGLY. NOTIFY THE ARCHITECT OF ANY NEEDED MODIFICATIONS.**
 - 1) The Wall Covering System shall consist of the exterior 24 gauge, metal wall panels, panel attachments, wall accessories, sealants, mastics, trim and flashings as required.
 - 2) Wall Systems shall consist of MBCI's exposed wall panel attachments to secondary structural members, sealants, mastics, closures and trim and/or flashings necessary to provide weathertightness and/or finish appearance.
 - (a) Vertical Wall Panels #1 (Primary): MBCI. PBR panel, 24 gauge, exposed fasteners.
 - (b) Wall Panel color to be manufacturer's (MBCI, or equal) Kynar 500 finish. Color to match existing.
 - 3) Wall Panel side laps shall be at least one full major rib. The wall overlapping rib utilizes a capillary groove. All vertical panels shall be continuous from sill to eave except where the length exceeds 41' or otherwise becomes prohibitive for handling purposes, in which case, endlaps shall be provided. Endlaps shall occur at a support member. The side wall panel may be crimped at the base and/or notched to match roof sheeting configurations at the eave.
 - 4) Metal rake trim color shall be selected by Architect from manufacturer's standards.
 - 5) Sealants, mastics and closures shall be manufacturer's standards. They shall be provided at rake, eave, transitions and accessories as required. Sealants and mastics are not normally provided at wall panel sidelaps and endlaps.
 - 6) If required: Concealed fasteners shall be self-drilling of the type and size required by wall secondary structural members. Location and quantities of fasteners shall be manufacturer's standards based upon building design and/or finished appearance.
 - 7) Exposed wall fasteners shall be self-drilling, hex head coated carbon steel. Color of fastener heads shall match the wall panel finish.
- l. Accessories (single color to be used for all, selected by Architect from manufacturer's standard color line)
 - 1) Flashing and Trim: Flashing and/or trim shall be supplied at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required to provide weathertightness and/or a finished appearance. Standard trim configurations and or finishes for given conditions shall be determined by the specific roof and wall panel system and finish combinations.
 - 2) Closures, Mastics and Sealants: Closures, formed to match roof and wall panel profiles shall be supplied as required to provide weathertightness. Closures shall be of closed cell material, normally EPDM (Ethylene-Propylene-Duene-Monomer) in a grey or neutral color. Preformed tape mastics, and/or non-skinning tube sealants shall be supplied for the sidelaps and endlaps of all roof coverings. Tape mastic shall be preformed butyl rubber-based compound. The compound shall be non-hardening, non-corrosive to metal and provide proper adhesion properties. Tape mastic shall be white or light grey in color. Tube Sealant shall be a synthetic elastomer based material. Sealant color shall be grey.
 - 3) Framed Openings: Framed wall openings shall be cold-formed gage material designed to meet specified loads. Openings shall be flashed with trim so that no primed steel is exposed to the exterior.
 - 4) Gutters: Eave gutters shall be roll-formed, factory finished 26 gage and include gutter straps, fasteners and joint sealant. Eave gutter downspouts shall be 4" x 5" x 10' lengths. Colors for gutters, downspout elbows and downspout straps shall be selected from manufacturer's standards.
- m. Thermal Insulation
 - 1) Glass fiber blanket insulation: Simple Saver System, R30 at roofs as specified in Section 072100 - Building Insulation.
 - 2) Facing material, factory laminated to the glass fiber insulation shall be vinyl scrim - white.
- n. Doors and Frames: See Section 081000 - Metal Doors and Frames.

PART 3 - EXECUTION

3.1 ERECTION

- A. Bolt settings and other dimensions shall be held to a tolerance of plus or minus 1/8-inch. Use templates or other gaging devices to assure accurate spacing of anchor bolts. Bolt field connections unless otherwise shown or specified.
1. Set accurately bases or sill members to obtain uniform bearing and steel maintain established floor line elevation. Anchors and anchor bolts for securing members to concrete curb or structural steel sub-frame shall be of black steel, set accurately to templates and of proper size to adequately resist applicable design loads at the base.
- B. Wall Panels: Panels shall be applied with configurations running in a vertical position (see Drawings). Supply vertical panels in single lengths from base to eave with no horizontal joints, except at the junction of door units, louver panels, and similar openings. End laps for panels shall be not less than four inches. Walls shall be closed at base and eave, and around doors, frames, louvers, and other similar openings by flashings and/or formed closures to assure adequate weathertightness. Flashing or stops will not be required where weather-closed or approved self-flashing panels are used.
- C. Roof Panels: Roof panels shall be applied with configurations running in direction of roof slope. Supply panels with no transverse joints except at junctions for roof openings. Lay side laps away from prevailing winds, and seal side laps and end-laps of roof with roof joint sealant. Roof shall be flashed and/or sealed at eaves and rakes, at projections through roof, and elsewhere as necessary to make roof weather tight. Flashing and/or caulking shall be accomplished in a manner that will assure complete weather-tightness and method to be used shall be subject to approval by Architect. Minimum end-laps for roofing and ridge caps shall be six inches; other minimum end-laps shall be not less than 12 inches.
1. Install insulation on interior face of roof sheets or panels as shown on approved shop drawings. Secure materials permanently in place and free of inordinate deflection. Finished work shall be neat, clean, uniform in appearance, and free of noticeable variations in color and texture.
- D. **FASTENERS FOR SECURING ROOF AND WALL PANELS: FIELD VERIFY THE EXISTING FASTENER SYSTEMS AND MATCH IT. MODIFY THE FOLLOWING INFORMATION ACCORDINGLY AND NOTIFY THE ARCHITECT OF ANY NEEDED MODIFICATIONS.** Fastening method, size and spacing shall be as recommended by metal building manufacturer and as approved by Architect. Exposed fastening at Wall Panel and concealed fastening Roof Panels. Fasteners shall be non-corrosive and of design that will produce a weathertight connection. Clearly show fasteners and fastening method on shop and erection drawings. Field paint exterior exposed fastenings to match adjacent panels.

END OF SECTION

SECTION 138510 - FIRE ALARM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fire alarm systems.
- B. See Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.
- C. Definitions:
 - 1. FACP: Fire alarm control panel.
 - 2. LED: Light-emitting diode.
 - 3. Definitions in NFPA 72 apply to fire alarm terms used in this Section.
- D. System Description:
 - 1. Noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.
- E. General Requirements:
 - 1. At the time of bid, all exceptions taken to these Specifications, all variances from these Specifications and all substitutions of operating capabilities or equipment called for in these Specifications shall be listed in writing and forwarded to the consulting engineer. Any such exceptions, variances or substitutions which were not listed at the time of bid and are identified in the submittal shall be grounds for immediate disapproval without comment.
- F. Performance Requirements:
 - 1. Comply with NFPA 72.
 - 2. Fire alarm signal initiation shall be by one or more of the following devices:
 - a. Manual stations.
 - b. Heat detectors.
 - c. Smoke detectors.
 - d. Automatic sprinkler system water flow.
 - e. Fire extinguishing system operation.
 - 3. Fire alarm signal shall initiate the following actions:
 - a. Alarm notification appliances shall operate continuously.
 - b. Identify alarm at the FACP and remote annunciators.
 - c. De-energize electromagnetic door holders.
 - d. Transmit an alarm signal to the remote alarm receiving station.
 - e. Unlock electric door locks in designated egress paths.
 - f. Release fire and smoke doors held open by magnetic door holders.
 - g. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
 - h. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
 - i. Record events in the system memory.
 - 4. Supervisory signal initiation shall be by one or more of the following devices or actions:
 - a. Operation of a fire-protection system valve tamper.
 - 5. System trouble signal initiation shall be by one or more of the following devices or actions:
 - a. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
 - b. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
 - c. Loss of primary power at the FACP.
 - d. Ground or a single break in FACP internal circuits.
 - e. Abnormal ac voltage at the FACP.
 - f. A break in standby battery circuitry.

- g. Failure of battery charging.
- h. Abnormal position of any switch at the FACP or annunciator.
- 6. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP and remote annunciators. Record event.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
 - 2. Device Address List: Coordinate with final system programming.
 - 3. System riser diagram with device addresses, conduit sizes, cable and wire types and sizes.
 - 4. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
 - 5. Batteries: Size calculations.
- C. Operation and maintenance data.
- D. Documentation:
 - 1. Submit test report on completed system at project closeout.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project. Manufacturer's authorized personnel shall be licensed by the Arkansas Alarm System licensing board. Bidders should include license numbers with bid.
- B. 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.
- C. All system components of the fire alarm system shall be UL listed for fire alarm use. All major components shall bear the UL label.
- D. All system components shall comply with applicable provisions of NFPA 72.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. FACP and Equipment:
 - a. Siemens.
 - b. SimplexGrinnell.

2.2 FACP

- A. General Description:
 - 1. Modular, power-limited design with electronic modules, UL 864 listed.
 - 2. Addressable control circuits for operation of mechanical equipment.
 - 3. System shall have spare capacity for future expansion.

- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, one line of 40 characters, minimum.
 - 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- C. Circuits:
 - 1. Signaling Line Circuits: NFPA 72, Class A, Style 6.
 - a. System Layout: Install no more than 50 addressable devices on each signaling line circuit.
 - 2. Notification-Appliance Circuits: NFPA 72, Class A, Style Z.
 - 3. Actuation of alarm notification appliances, annunciation, smoke control, elevator recall, and actuation of suppression systems shall occur within 10 seconds after the activation of an initiating device.
 - 4. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.
- D. Smoke-Alarm Verification:
 - 1. Initiate audible and visible indication of an "alarm verification" signal at the FACP.
 - 2. Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
 - 3. Record events.
 - 4. Sound general alarm if the alarm is verified.
 - 5. Cancel FACP indication and system reset if the alarm is not verified.
- E. Notification-Appliance Circuit: Operation shall sound in a temporal pattern, complying with ANSI S3.41 or 60 beats per minute, march-time pattern.
- F. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.
- G. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP and remote annunciators, after initiating devices are restored to normal.
 - 1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
 - 2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
 - 3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.
- H. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.
- I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a digital alarm communicator transmitter and telephone lines.
- J. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal shall be powered by the 24-V dc source.
 - 1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
 - 2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM SYSTEM POWER."
- K. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.
 - 1. Battery and Charger Capacity: Comply with NFPA 72.

- L. Surge Protection:
 - 1. Install surge protection on normal ac power for the FACP and its accessories.
 - 2. Install surge protectors recommended by FACP manufacturer. Install on all system wiring external to the building housing the FACP.
- M. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE ALARM BOXES

- A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box. Furnish at all exterior doors and exits from floors.
 - 1. Single-action mechanism. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
 - 2. Station Reset: Key- or wrench-operated switch.

2.4 SYSTEM SMOKE DETECTORS

- A. General Description:
 - 1. UL 268 listed, operating at 24-V dc, nominal.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 - 3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 4. Integral Visual-Indicating Light: LED type. Indicating status.
- B. Photoelectric Smoke Detectors and Duct Smoke Detectors:
 - 1. Sensor: LED or infrared light source with matching silicon-cell receiver.
 - 2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
 - 3. Provide remote status and alarm indicator and test station where indicated on drawings for duct detectors.
 - 4. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied for duct detectors.
 - 5. Relay Fan Shutdown for duct detectors: Rated to interrupt fan motor-control circuit.

2.5 HEAT DETECTORS

- A. General: UL 521 listed. Fixed temperature type.

2.6 NOTIFICATION APPLIANCES

- A. Description: Equipped for mounting as indicated and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
- B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn.
- C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens. Rated Light Output: 110 candela.

2.7 SPRINKLER SYSTEM REMOTE INDICATORS

- A. Remote status and alarm indicator and test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single-gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.8 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.

2.9 REMOTE ANNUNCIATOR

- A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Flush cabinet, NEMA 250, Class 1.
- B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.10 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.
- B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall or to a circuit-breaker shunt trip for power shutdown.

2.11 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG or size as recommended by system manufacturer.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.
 - 1. Connect new equipment to the existing control panel in the existing part of the building.
 - 2. Connect new equipment to the existing monitoring equipment at the Supervising Station.
 - 3. Expand, modify, and supplement the existing equipment as necessary to extend the existing control functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.
- B. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.

- C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.
- D. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
- E. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- F. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install horns on flush-mounted back boxes with device-operating mechanism concealed behind a grille.
- G. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.
- H. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- I. FACP and annunciator: Surface mount with tops of cabinets not more than 72 inches above the finished floor.

3.2 WIRING INSTALLATION

- A. Install entire system in accordance with approved manufacturer's wiring diagrams. Furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type and size recommended by the manufacturer and shall be approved by the local fire department.
- B. Install wiring according to the following:
 - 1. NECA 1.
 - 2. TIA/EIA 568-A.
- C. Wiring Method.
 - 1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
- D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

3.3 GROUNDING

- A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
 - 2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.
 - 3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
 - 4. Testing: Follow procedure and record results complying with requirements in NFPA 72.
 - 5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

3.5 DEMONSTRATION

- A. Test each individual system operation, on an address by address and circuit by circuit basis, for complete operation. Procedure for testing the system shall be set forth with the consent of the code enforcement official, engineer and manufacturer.
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Provide a minimum of four hours training.
- C. Provide four (4) complete manuals on the installed system to the Owner. Include operating and maintenance instructions, catalog cut sheets of all equipment, as-built drawings (floor plans and risers) and a spare parts list.

END OF SECTION

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic hot-water piping.
 - 2. Supplies and drains for handicap-accessible lavatories and sinks.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells.
- E. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

2.2 INSULATING CEMENTS

- A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers:
 - 1. Description: Manufactured plastic wraps for covering plumbing fixture **hot- and cold-water supplies** and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches] o.c.

- a. For below-ambient services, apply vapor-barrier mastic over staples.
- 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
- 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
- C. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.

3.4 INSTALLATION OF CELLULAR-GLASS INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
 - 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A.** Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD QUALITY CONTROL

- A.** Perform tests and inspections.
- B.** All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Copper tube and fittings.
 - 2. Transition fittings.
 - 3. Dielectric fittings.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."
- C. Comply with NSF 372 for low lead.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: **ASTM B 88, Type L and ASTM B 88, Type M** water tube, drawn temper.
- B. Soft Copper Tube: **ASTM B 88, Type K and ASTM B 88, Type L** water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint or threaded ends.
- G. Copper Pressure-Seal-Joint Fittings:
 - 1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
 - 2. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Copper Push-on-Joint Fittings:

1. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
2. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

2.3 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: **125 psig minimum at 180 deg F.**
3. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance.
- D. Install shutoff valve immediately upstream of each dielectric fitting.
- E. Install domestic water piping level and plumb.
- F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

- I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- J. Install piping to permit valve servicing.
- K. Install piping free of sags and bends.
- L. Install fittings for changes in direction and branch connections.
- M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- N. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump.

3.2 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.3 HANGER AND SUPPORT INSTALLATION

- A. Support vertical piping and tubing at base and at each floor.
- B. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- C. Install supports for vertical copper tubing every 10 feet.

3.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

- c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Clean and disinfect potable domestic water piping per Authority Having Jurisdiction.

B. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-iron soil pipe and fittings.
2. PVC pipe and fittings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: **10-foot head of water.**

2.2 PIPING MATERIALS

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

2.3 CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 PVC PIPE AND FITTINGS

- A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
- B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
 - 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
 - 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
 - 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
 - 2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 - 3. Do not change direction of flow more than 90 degrees.
 - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of waste piping in direction of flow is prohibited.
- J. Lay buried building waste piping beginning at low point of each system.
 - 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
 - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 - 3. Maintain swab in piping and pull past each joint as completed.
- K. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- L. Install aboveground PVC piping according to ASTM D 2665.

M. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
 2. Install drains in sanitary waste gravity-flow piping.
- N.** Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O.** Install sleeves for piping penetrations of walls, ceilings, and floors.
- P.** Install sleeve seals for piping penetrations of concrete walls and slabs.
- Q.** Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 CONNECTIONS

- A.** Drawings indicate general arrangement of piping, fittings, and specialties.
- B.** Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C.** Connect waste and vent piping to the following:
1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
- D.** Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.3 FIELD QUALITY CONTROL

- A.** During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B.** Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C.** Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

2. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
 - a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
 - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. Inspect joints for leaks.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.4 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Repair damage to adjacent materials caused by waste and vent piping installation.

END OF SECTION 221316

SECTION 230100 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Dielectric fittings.
 - 3. Vibration Isolators
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. Mechanical demolition.
 - 9. Equipment installation requirements common to equipment sections.
 - 10. Concrete bases.
 - 11. Supports and anchorages.

1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

- A. Submit for approval, Manufacturer's technical data sheets including performance specifications for all equipment and air devices shown on the schedules. Also, provide data on all system accessories and all materials. Include all piping, ductwork and insulation materials. Accessories to be submitted on shall include valves and all piping accessories, and all ductwork accessories including extractors, turning vanes, control dampers and balancing dampers.
- B. Submit for approval, contractor's original shop drawings of all assemblies of manufactured items including control diagrams. Submit all items called out in individual sections, in addition to those called for in this section.

- C. Indicate all pertinent dimensions on scale drawings necessary for clarity and/or coordination of the installation between trades.
- D. Provide complete electrical wiring diagrams.
- E. Make submittals for all work contained in Division 15 at one time except by special permission.
- F. Bind submittals in durable covers with contents conveniently organized and properly indexed with index tabs.
- G. Obtain approval on product manufacturers not specifically named prior to making bidding.
- H. Each mechanical section contains a listing of required submittals only for convenience.
- I. Submit for approval a schedule of nameplates and manufacturer's data sheets and shop drawings on special supports and seals.
- J. Provide performance data on all substituted items to demonstrate equality to those scheduled. Include all sound levels, rpm, velocity and other data as applicable.
- K. Submit proposed changes in ducts, piping, and equipment layout before ordering or fabrication as stated below under intent.

1.4 INTENT

- A. It is intended that the contractor provide a complete and operating mechanical system including all incidental items and connections necessary for proper operation or customarily included even though each and every item may not be indicated.
- B. The drawings indicate the general layout requirements for equipment, fixtures, piping, ductwork, etc. Final layout will be governed by actual field conditions with all measurements verified at the site. Contractor shall verify that all equipment, piping, ducts and other components will fit in the space provided before fabrication or ordering. Contractor shall submit any proposed changes to the Engineer for approval before fabrication or ordering.
- C. It is intended that the mechanical installation be safe, reliable, energy efficient, and easily maintained with adequate provisions allowed for access to equipment.
- D. It is intended that the mechanical system operate quietly with noise levels below the criteria recommended for the application by ASHRAE. Provide corrective action as required to reduce objectionable noise or vibration.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit

breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Furnish only new standard products of a manufacturer regularly engaged in the production of said products.
- B. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- C. Where multiple units of the same type or class of product are required, provide all units of the same manufacturer.
- D. Store products in the original containers and shelter in a suitable environment at an approved location. Make readily accessible for inspections and inventory accounting.
- E. For products specified by generic reference standard, select any product meeting such standard.
- F. For products specified by naming one or more products or manufacturers, select any named. Submit request, in writing, for substitution of any product or manufacturer not specifically named and obtain approval at least five working days prior to bid date.
- G. Provide all information to support claim of equality of product proposed for substitution. Substitutions will be considered only if equivalent in quality, efficiency, performance, size, weight, reliability, appearance, and ease of maintenance to the specified product.
- H. Where approved product substitutions alter the design, space requirements, electrical requirements, connections, etc. include all work necessary to provide a complete installation of quality equal to or better than that which would have been achieved with products or manufacturers as specified.

2.2 MECHANICAL IDENTIFICATION

- A. Identify each major component as to manufacturer's name, address, model and serial number, and pertinent ratings on a durable nameplate attached to the component in a conspicuous place.
- B. Identify each major component as it is named on the drawings or referred to herein with engraved nameplates made from laminated plastic sheets.
- C. Identify each valve, except obvious equipment isolation valves, with black filled coded numbers engraved on brass nametags attached with brass jack chains. Provide typewritten legend of numbered valves.
- D. Identify each pipe or exposed duct in equipment rooms or above accessible ceilings with permanent markers as manufactured by Seton. Indicate fluid conveyed and direction of flow. Install on each pipe or duct where it enters or leaves a wall or floor and at other intervals not to exceed 20 feet.
- E. Identify each major outdoor underground line with continuous strips of plastic utility marker tape as manufactured by Seton stating at regular intervals "CAUTION (identify utility) PIPE BELOW". Install one foot directly above pipe before backfilling to grade.

2.3 VIBRATION ISOLATORS

- A. Double deflection neoprene mounting shall have a minimum static deflection of 0.35 inches. All metal surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom so they need not be bolted to the floor. Bolt holes shall be provided for these areas where bolting is required. On equipment such as small vent sets and close coupled pumps, steel rails shall be used above the mountings to compensate for the overhang. Mountings shall be type ND or rails type DNR as manufactured by Mason Industries.
- B. Spring type isolators shall be free standing and laterally stable without any housing and complete with ¼" neoprene acoustical friction pads between base plate and support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height. Mounting shall be type SLF as manufactured by Mason Industries.
- C. Vibration Hangers shall contain a steel spring and 0.3" deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Hangers shall be type 30N as manufactured by Mason Industries.
- D. Install vibration isolators on all motor driven equipment.

2.4 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.5 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.

2.6 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.7 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Stainless steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.8 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. PVC Pipe: ASTM D 1785, Schedule 40.
- E. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.9 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

2.10 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

- A. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - 4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
 - 5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - 7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 MANUFACTURER'S DIRECTIONS

- A. Handle, install, connect, test, and operate all products, assemblies, and systems in accordance with manufacturer's recommendations.
- B. In case of conflicting requirements between the manufacturer's directions and the Contract Documents, obtain specific instructions before proceeding with any work.

3.3 WORKMANSHIP

- A. Keep the premises clean and free from debris, dirt, etc. Upon completion of work, clean and polish all fixtures, equipment, etc.
- B. Seal all ductwork during construction to prevent construction dust from entering ductwork.
- C. Perform all work in accordance with best practices of the trade and provide a "neat" installation by mechanics skilled in their respective trades and properly licensed.
- D. Accurately install piping, ductwork and other equipment plumb, level and true to line with runs parallel or perpendicular to building lines. Make bends and offsets uniform.

- E. Do not cut any structural members without specific approval. Do not cut mechanical or electrical lines that may be concealed.
- F. Coordinate with other trade's work and install all work so that systems and components can be easily maintained and can be removed for replacement in the future.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.5 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.6 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.7 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.8 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3.

3.9 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.10 POST CONSTRUCTION SUBMITTALS

- A. Deliver special tools, lubricants, and other products necessary for proper operation and maintenance of the mechanical system.
- B. Deliver spare parts called for under other mechanical sections contained herein or on drawings.
- C. Submit project record documents indicating all changes made during construction.
- D. Submit certificates of Final Inspection from the administrative authority.
- E. Submit Operations and Maintenance manuals covering all phases of equipment and systems provided. Include complete spare parts data. With a source of supply. Include a copy of the shop drawings required in the "Pre-Construction Submittals".
- F. Submit extended warranties in excess of the standard one year construction warranty where required by other mechanical sections.
- G. Submit Test, Adjust and Balance (TAB) report on approved record forms.

3.11 INSTRUCTIONS TO OWNER

- A. Provide competent instruction to Owner's personnel covering operation and maintenance of all mechanical systems. Provide specialized training by manufacturer's technical representatives when required.

END OF SECTION 230100

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing, adjustment, and balancing of air systems.
 - 2. Measurement of final operating condition of HVAC systems.
 - 3. Sound measurement of equipment operating conditions.
 - 4. Vibration measurement of equipment operating conditions.
- B. Related Documents: The Contract Documents, as defined in Section 01110 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. Associated Air Balance Council (AABC):
 - 1. AABC - National Standards for Total System Balance.
- B. National Environmental Balancing Bureau (NEBB).

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 2) Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for inclusion in operating and maintenance manuals.
 - 3) Provide reports in binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 4) Indicate data on AABC National Standards for Total System Balance forms.
 - b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Actual locations of balancing valves and rough setting.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Company specializing in testing, adjusting, and balancing. Company to be certified by one of the following.
 - a. AABC Certified Independent Testing and Balancing Agency.
 - b. National Environmental Balancing Bureau Certified Independent Agency. (NEBB).

- B. Testing, Adjusting, and Balancing Reports: Use testing, adjusting, and balancing Agent's standard forms.

PART 2 - PRODUCTS

(Not Used.)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.

3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Contracting Officer to facilitate spot checks during testing.
- B. Provide additional balancing instruments as required.

3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Contracting Officer.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities. Perform this work with cooling system energized where applicable to obtain the extra resistance of wet coils.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

END OF SECTION 230593

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:**
 - 1. Insulation Materials:**
 - a. Cellular glass.
 - b. Flexible elastomeric.
 - c. Foam/vinyl.
 - d. Polystyrene.
- B. Systems Included:**
 - 1. Exterior duct wrap insulation.
 - 2. Refrigerant piping insulation.
 - 3. Cooling condensate drain insulation.

1.2 SUBMITTALS

- A. Product Data:** Submit for each type of insulation to be used.

1.3 QUALITY ASSURANCE

- A.** Perform installation in accordance with MICA, Commercial and Industrial Insulation Standards.
- B.** Follow manufacturer's directions on adhesive application, fastener spacing, etc.
- C. Fire-Test-Response Characteristics:** Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Flexible fiberglass exterior duct wrap equal to FRK-25.**
 - 1. K-Factor no greater than 0.3.
 - 2. ¾ pound density.
 - 3. Foil reinforced kraft (FRK) vapor barrier.

- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that applies to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
- C. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- D. Install multiple layers of insulation with longitudinal and end seams staggered.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- N. For above ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - 5. Handholes.
 - 6. Cleanouts.
- O. Provide aluminum sheet metal over insulation exposed outdoors above grade. Use rivets and seal joints watertight.
- P. Ducts 18" upstream and 30" downstream of electric resistance and fuel-burning heaters located within duct system will be wrapped externally with fiberglass duct wrap.
- Q. All supply and return air duct systems installed in any unconditioned space shall be insulated with a minimum of 2" thickness, 3/4 lb. density wrap.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:

All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.4 INSULATION SCHEDULE

- A. Refer to the drawings.

END OF SECTION 230700

SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Manual gas shutoff valves.
5. Pressure regulators.
6. Dielectric unions.

1.2 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: **100 psig** minimum unless otherwise indicated.
2. Service Regulators: **100 psig** minimum unless otherwise indicated.

- B. Natural-Gas System Pressure within Buildings: **0.5 psig**.

2.2 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.

3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.3 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller.
3. Strainer Screen: **40**-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

2.4 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.5 MANUAL GAS SHUTOFF VALVES

A. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: **125 psig**.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller.

2.7 DIELECTRIC UNIONS

- A. Dielectric Unions:
1. Description:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: **125 psig**.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.8 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 OUTDOOR PIPING INSTALLATION

- A. Comply with **NFPA 54 and the International Fuel Gas Code** for installation and purging of natural-gas piping.
- B. Install underground, natural-gas piping buried at least **36 inches** below finished grade.
- C. Install underground, PE, natural-gas piping according to ASTM D 2774.
- D. Steel Piping with Protective Coating:
1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 3. Replace pipe having damaged PE coating with new pipe.
- E. Install fittings for changes in direction and branch connections.

3.2 INDOOR PIPING INSTALLATION

- A. Comply with **NFPA 54 and the International Fuel Gas Code** for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Verify final equipment locations for roughing-in.
- L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- Q. Connect branch piping from top or side of horizontal piping.
- R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.
- S. Do not use natural-gas piping as grounding electrode.
- T. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.3 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector.

- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install anode for metallic valves in underground PE piping.

3.4 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.
- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.5 FIELD QUALITY CONTROL

- A. Test, inspect, and purge natural gas according to **NFPA 54** and authorities having jurisdiction.
- B. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 231123

SECTION 233113 – METAL DUCTWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes metal, rectangular ducts and fittings for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg.

1.2 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal ducts.
 - 1. Penetrations through fire-rated and other partitions.
 - 2. Duct accessories, including access doors and panels.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 SEALANT MATERIALS

- A. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.
- B. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.3 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
 - 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A 36/A 36M.
- E. Gripple Cable Hanger System for Air Distribution.

2.4 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
 - 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
- C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
- D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- B. Install ducts with fewest possible joints.

- C. Install fabricated fittings for changes in directions, size, and shape and for connections.
- D. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
- E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.
- M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section "Duct Accessories."
- N. Protect duct interiors from the elements and foreign materials until building is enclosed.

3.2 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
- B. Seal ducts before external insulation is applied.

3.3 HANGING AND SUPPORTING

- A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- B. Support vertical ducts at maximum intervals of 16 feet and at each floor.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.
- E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

3.4 CONNECTIONS

- A. Make connections to equipment with flexible connectors.
- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 233113

SECTION 233300 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft and Volume dampers.
 - 2. Fire dampers (including ceiling fire dampers).
 - 3. Turning vanes.
 - 4. Duct-mounting access doors.
 - 5. Flexible connectors.
 - 6. Flexible ducts.
 - 7. Duct accessory hardware.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Backdraft and Volume dampers.
 - 2. Fire dampers.
 - 3. Turning vanes.
 - 4. Duct-mounting access doors.
 - 5. Flexible connectors.
 - 6. Flexible ducts.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of assembly, components, and location and size of each field connection.
 - 1. Special fittings.
 - 2. Manual-volume damper installations.
 - 3. Fire-damper installations, including sleeves and duct-mounting access doors.
 - 4. Wiring Diagrams: Power, signal, and control wiring.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT DAMPERS

- A. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

2.3 VOLUME DAMPERS

- A. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
 - 3. Blade Axles: Galvanized steel.
 - 4. Bearings: Molded synthetic.
 - 5. Tie Bars and Brackets: Galvanized steel.
- C. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- D. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.4 FIRE DAMPERS

- A. Manufacturers:
 - 1. Ruskin Company.
 - 2. Nailor Industries.
 - 3. United Enertech.
- B. Fire dampers shall be labeled according to UL 555.
- C. Fire Rating: 1-1/2 hours.

- D. Frame: Curtain type with blades inside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.
- E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
 - 2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.
- F. Mounting Orientation: Vertical or horizontal as indicated.
- G. Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.
- H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- I. Fusible Links: Replaceable, 165 deg F rated.

2.5 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- B. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.6 DUCT-MOUNTING ACCESS DOORS

- A. General Description: Fabricate doors airtight and suitable for duct pressure class.
- B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
 - 1. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.
 - 1. Frame: Galvanized sheet steel, with spin-in notched frame.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.7 FLEXIBLE CONNECTORS

- A. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

2.8 FLEXIBLE DUCTS

- A. Noninsulated-Duct Connectors: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.
 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 2. Maximum Air Velocity: 4000 fpm.
 3. Temperature Range: Minus 20 to plus 210 deg F.
- B. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.
 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 2. Maximum Air Velocity: 4000 fpm.
 3. Temperature Range: Minus 10 to plus 160 deg F.
- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.9 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers on exhaust fans or nearest to outside and where indicated.
- D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- F. Install fire dampers, with fusible links, according to manufacturer's UL-approved written instructions.
- G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

DUCT ACCESSORIES

1. On both sides of duct coils.
 2. Downstream from volume dampers and equipment.
 3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
 4. On sides of ducts where adequate clearance is available.
- H. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- I. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- J. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- K. Connect diffusers or light troffer boots to low pressure ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- L. Connect flexible ducts to metal ducts with adhesive.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 233300

SECTION 260500 – GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. General electrical installation requirements.

1.2 PRE-CONSTRUCTION SUBMITTALS

- A. Submit for approval Manufacturer's technical data sheets including performance specifications for all equipment, major materials and other manufactured items. Obtain approval on product manufacturers not specifically names prior to making submittals.
- B. Bind submittals in durable covers with contents conveniently organized and properly indexed.
- C. Make submittals on all work in Division 26 at one time, except by special permission.

1.3 INTENT

- A. It is intended that the contractor provide a complete and operating electrical system including all incidental items and conditions necessary for proper operation or customarily included even though each and every item may not be indicated.
- B. The drawings indicate the general layout requirements for equipment, fixtures, conduit, devices, etc. Final layout will be governed by actual field conditions with all measurements verified at the site.
- C. Conduit and wiring shown on the drawings is diagrammatic unless otherwise noted, and is intended to indicate switching and branch circuit arrangements, phase balance, and general wiring connection requirements.
- D. It is intended that the electrical installation be safe, reliable, energy efficient and easily maintained with adequate provisions for access to equipment.
- E. It is intended that the electrical system operate with noise levels below the criteria recommended by NEMA. Provide corrective action to reduce objectionable hum or vibration.
- F. Isolated ground circuits as well as circuits serving non-linear loads and those serving ground fault circuit breakers must have their own neutral or isolated ground.

1.4 TEMPORARY LIGHTING AND POWER

- A. Provide general and task lighting for construction activity as required for adequate illumination. Provide 5 foot candles minimum for general illumination. Protect lamps with wire guards or tempered glass enclosures. Provide exterior type fixtures where exposed to weather or moisture.

- B. Provide general purpose outlets and special outlets for construction activities. Provide circuits of proper sizes and ratings for each use required. Install wiring where least exposed to damage. Provide rigid steel conduit to protect wiring on grade, floors or decks.
- C. Provide 20 amp, 4-gang receptacle outlets, equipped with ground fault circuit interrupters, reset button and pilot light, spaced so that a 100 foot extension cord can reach each area of work.
- D. Provide warning signs at outlets that are other than 20 amp, 120 volt.

1.5 COORDINATION

- A. The contractor is cautioned to examine all drawings and specifications relating to other trades of work, and he shall make proper provisions to review all other work.
- B. The architectural, structural and civil plans and specifications, including the General Conditions and all supplements issued thereto, information to bidders, and other pertinent documents issued by the Engineer, are a part of these specifications and the accompanying electrical plans, and shall be complied with in every respect. All of the above is included herewith, and shall be examined by all bidders. Failure to comply shall not relieve the contractor of responsibility or be used as a basis for additional compensation due to omission of architectural, structural or civil details from the electrical drawings.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. All materials and equipment used in carrying out these specifications to be American made unless approved otherwise by the Engineer and to be new and have UL listing, or listing by other recognized testing laboratory when such listings are available. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Engineer approval.
- B. Furnish only new standard products of a manufacturer regularly engaged in the production of said products.
- C. Support all products by service organizations with spare parts inventory and personnel located reasonably close to the site.
- D. Where multiple units of the same type or class are required, provide all units of the same manufacturer.

2.2 PRODUCT HANDLING

- A. Store products in their original containers and shelter in a suitable environment.
- B. Make products readily available for inspections and inventory.

2.3 SUBSTITUTIONS

- A. For products specified by generic reference, select any product meeting such standard.
- B. For products specified by naming one or more products or manufacturers, select any named. Submit request in writing for substitution of any manufacturer not specifically named and obtain approval at least 5 days prior to bidding.

- C. Provide all information required to support claim of equality of product proposed for substitution. Substitutions will be considered only if equivalent in quality, efficiency, performance, size, weight, reliability, appearance and ease of maintenance to specified product.
- D. Where approved substitutions alter the design, space requirements, electrical requirements, connections, cooling loads, etc. include all work necessary to provide a complete installation of quality equal to or better than that obtained with product or manufacturer specified.

2.4 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.5 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Plastic. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

3.5 MANUFACTURER'S DIRECTIONS

- A. Handle, install, connect, test and operate all products and systems in accordance with manufacturer's recommendations. In case of conflicting requirements between manufacturer's directions and contract documents, obtain instructions before proceeding with work.

3.6 INSPECTIONS

- A. Arrange with administrative authority for inspections of all work and obtain approval prior to concealing or proceeding. Give adequate notice before concealing any work for inspections by Owner's representatives.

3.7 CLEANING

- A. Keep premises free and clean of dirt, debris, etc. Upon completion of work clean and polish all fixtures, equipment, etc.

3.8 WORKMANSHIP

- A. No person shall perform electrical work without possessing a Master or Journeyman License from the state electrical examiner's board. All electrical work and apprentices shall be supervised by a Master or Journeyman electrician.
- B. Carefully perform all cutting, drilling, digging, etc. and patch or refinish disturbed area to the condition of adjoining or similar surfaces. Do not cut any structural members.
- C. Conceal conduit in chases, furrings, or above ceilings unless otherwise noted. Flush mount equipment in finished walls wherever possible.

3.9 FLAME AND SMOKE CONSIDERATIONS

- A. In enclosures or plenums used for transporting environmental air, use only products conforming to NFPA and UL classifications not exceeding 25 for flame spread and 50 for smoke developed ratings, or install in conduit. This requirement applies to all materials.
- B. Completely seal all penetrations through fire and/or smoke rated walls, ceilings, floors or other barriers with UL listed material to preserve the rating of the barrier.

3.10 COORDINATION

- A. Coordinate the electrical work with the work of all other trades. Piping or equipment requiring slope or specific mounting height will have right of way over conduit and other products whose elevation can be changed.

3.11 EQUIPMENT CONNECTIONS

- A. Make all required electrical connections to each item of equipment shown or specified including equipment furnished by Owner, and make operational.

3.12 PROTECTION REQUIREMENTS

- A. Locate existing utility lines and identify and protect during excavation and installation.
- B. Protect all work including building finishes against damage due to dirt, water, chemicals, handling, theft, etc. Close all openings in conduit and equipment during installation.
- C. Provide warning devices around all exposed "live" parts or high temperature surfaces.

3.13 PAINTING

- A. Paint conduit, equipment, etc. exposed in finished areas to match adjacent surfaces. Touch up scratches in factory finished surfaces with a paint to match.
- B. All exposed exterior conduit and equipment shall be painted for a uniform appearance. If exposed through grilles or other openings, paint conduit flat black.
- C. Paint plywood backboards used for mounting equipment.

3.14 TESTING AND ADJUSTING

- A. Test the completed electrical system and prove free of short circuits, poor connections, and improper grounding. Test all systems to assure safe operation.
- B. Verify proper taps on motors and transformers for rated performance.

3.15 POST CONSTRUCTION SUBMITTALS

- A. Submit project record documents indicating all changes to contract documents made during construction.
- B. Submit certificates of final inspection from administrative authority or manufacturer.
- C. Deliver all special tools and spare parts necessary for proper operation and maintenance and as called for in other electrical sections.
- D. Submit operations and maintenance (O&M) manuals covering all phases of equipment and systems provided. Include complete spare parts data and copy of manufacturing data sheets and shop drawings required in pre-construction submittals.
- E. Submit extended warranties required in excess of one year.
- F. Assemble all closeout documents for electrical system in 3-ring binders with divider tabs labeled and properly indexed. Submit the number of sets as required by the Architect.

3.16 INSTRUCTIONS TO OWNER

- A. Provide competent instruction to the Owner's personnel covering operation and maintenance of all electrical systems. Provide specialized instruction by manufacturer's technical representative when required.

3.17 USE OF EQUIPMENT

- A. The contractor shall not use the permanent electrical system for construction activity except by special permission. If permitted, the contractor's use of any equipment shall not reduce the warranty time specified for any equipment.

3.18 GENERAL WARRANTY

- A. Warrant the electrical installation against defects for a period of one year from the date of substantial completion in accordance with Architect's specifications. Provide all labor, replacement parts, services, transportation and incidental costs necessary for proper operation of electrical systems during the warranty period. Make good any damage to the building or grounds or other equipment resulting from defects in products and/or workmanship during the warranty period.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less is not allowed except for 6-foot whips to light fixtures.
3. Connectors, splices, and terminations rated 600 V and less.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with **ASTM B 8** for stranded conductors.

D. Conductor Insulation:

1. Type NM: Comply with UL 83 and UL 719.
2. **Type THHN and Type THWN-2:** Comply with UL 83.
3. **Type THW and Type THW-2:** Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
4. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

- B. Limited to 6-foot lengths at final connection to light fixtures.

2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Feeders: Copper for feeders No. 4 AWG and larger. Retain one of two "Branch Circuits" paragraphs below.
- C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.3 CONNECTIONS

- A. 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-486B.
- B. Wiring at Outlets: Install conductor at each outlet, with at least **6 inches** of slack.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.2 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

- A. Insulated Conductors: **Copper** wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.

2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless **compression**-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Conduit Hubs: Mechanical type, terminal with threaded hub.
- G. Ground Rod Clamps: Mechanical type, copper or copper alloy.
- H. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with **zinc-plated or stainless-steel** bolts.
 - a. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and **copper ground connector rated for direct burial**.

2.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; **3/4 inch by 10 feet**.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for **No. 8** AWG and smaller, and stranded conductors for **No. 6** AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, **No. 2/0** AWG minimum.
 - 1. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Flexible raceway runs.
 - 6. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type

connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes and enclosures.

B. Related Requirements:

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. GRC: Comply with ANSI C80.1 and UL 6.
3. IMC: Comply with ANSI C80.6 and UL 1242.
4. PVC-Coated Steel Conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
5. EMT: Comply with ANSI C80.3 and UL 797.
6. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for EMT:
 - a. Material: **Steel**.
 - b. Type: **Setscrew or compression**.
4. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
5. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
- B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 1. ENT: Comply with NEMA TC 13 and UL 1653.
 - 2. LFNC: Comply with UL 1660.
- C. Nonmetallic Fittings:
 - 1. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - 2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
 - 3. Fittings for LFNC: Comply with UL 514B.
 - 4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, **Type 1** unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.
- C. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- D. Solvents and Adhesives: As recommended by conduit manufacturer.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- D. Metal Floor Boxes:
 - 1. Material: **Cast metal**.

2. Type: **Fully adjustable.**
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Nonmetallic Floor Boxes: Nonadjustable, **round or rectangular.**
1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
1. Listing and labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Small Sheet Metal Pull and Junction Boxes: **NEMA OS 1.**
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: **GRC or RNC, Type EPC-40-PVC.**
 2. Concealed Conduit, Aboveground: **GRC, IMC, or RNC, Type EPC-40-PVC.**
 3. Underground Conduit: **RNC, Type EPC-40-PVC.**
 4. Boxes and Enclosures, Aboveground: **NEMA 250, Type 3R.**
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
1. Exposed, Not Subject to Physical Damage: **EMT.**
 2. Exposed, Not Subject to Severe Physical Damage: **EMT.**
 3. Exposed and Subject to Severe Physical Damage: **GRC.** Raceway locations include the following:
 - a. Loading dock.
 - b. Mechanical rooms.
 - c. Gymnasiums.
 4. Concealed in Ceilings and Interior Walls and Partitions: **EMT.**
 5. Damp or Wet Locations: **GRC.**
- C. Minimum Raceway Size: **3/4-inch** trade size.
- D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- E. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Do not fasten conduits onto the bottom side of a metal deck roof.
- C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- F. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches of enclosures to which attached.
- I. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of **2 inches** of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- J. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- L. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- M. Locate boxes so that cover or plate will not span different building finishes.
- N. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- O. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- P. Set metal floor boxes level and flush with finished floor surface.
- Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit.
2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.**

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.**

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.**

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

- A. MCCB:** Molded-case circuit breaker.
- B. SPD:** Surge protective device.

1.3 ACTION SUBMITTALS

- A. Product Data:** For each type of panelboard.
- B. Shop Drawings:** For each panelboard and related equipment.
1. Include dimensioned plans, elevations, sections, and details.
 2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 3. Detail bus configuration, current, and voltage ratings.
 4. Short-circuit current rating of panelboards and overcurrent protective devices.

1.4 INFORMATIONAL SUBMITTALS

- A. Panelboard schedules** for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.**

1.6 FIELD CONDITIONS

- A. Service Conditions:** NEMA PB 1, usual service conditions.

1.7 WARRANTY

- A. Manufacturer's Warranty:** Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: **18** months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.
- D. Enclosures: **Flush and Surface**-mounted, dead-front cabinets.
 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, **Type 1**.
 - b. Outdoor Locations: NEMA 250, **Type 3R**.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, **Type 4**.
 2. Height: 84 inches maximum.
 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
- E. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 POWER PANELBOARDS

- A. Panelboards: NEMA PB 1, distribution type.
- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 1. For doors more than **36 inches** high, provide two latches, keyed alike.
- C. Mains: **Circuit breaker or Lugs only, see drawings**.
- D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- B. Mains: **Circuit breaker or lugs only**.

- C. Branch Overcurrent Protective Devices: **Bolt-on** circuit breakers, replaceable without disturbing adjacent units.
- D. Contactors in Main Bus: NEMA ICS 2, Class A, **mechanically** held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. External Control-Power Source: **120-V branch circuit**.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- F. Column-Type Panelboards: Single row of overcurrent devices with narrow gutter extension and overhead junction box equipped with ground and neutral terminal buses.

2.4 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Directory card inside panelboard door, mounted in **transparent card holder**.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install panelboards and accessories according to **NECA 407**.
- C. Mount top of trim **90 inches** above finished floor unless otherwise indicated.
- D. Mount panelboard cabinet plumb and rigid without distortion of box.
- E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
- G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- H. Install filler plates in unused spaces.
- I. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

- A. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- B. Panelboard Nameplates: Label each panelboard with a nameplate.

END OF SECTION 262416

SECTION 312000 – EARTH MOVING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 024100 - Demolition
 - 3. Section 321313 - Concrete Paving and Pavement Marking

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.
- C. **Employ at Contractor's expense, a testing laboratory and geotechnical engineer to perform soil testing and inspection service for quality control testing during earthwork operations as described in these Specifications.**

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory soil materials: SC, GC. Plasticity Index of 8 min. and 15 max. and liquid limit of 40.

2.2 BACKFILL AND FILL MATERIALS

- A. Fill and backfill materials:
 - 1. Provide soil materials which contain **NO** organic matter and deleterious substances, containing no rocks or lumps over 4" in greatest dimension, and with no more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
 - 2. Fill material is subject to the approval of the soil engineer and/or Architect, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soils completely free of roots and other deleterious matter.
 - 3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
 - 4. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the soil engineer.
 - 5. Where drainage fill is called for under building slabs and pool slab, provide aggregate complying with requirements of this Section of these Specifications.

2.3 TOPSOIL

- A. Where noted "Lawn" on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoils, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, liter, and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

2.4 BASE COURSE

- A. AHTD Aggregate Base Course, Class 7

2.5 DRAINAGE FILL

- A. ASTM C33, No. 67 gradation.

2.6 OTHER MATERIALS

- A. Provide materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.7 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

2.8 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

2.9 PROCEDURES

- A. Utilities:
 - 1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
 - 2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
 - 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utilities at no additional cost to the Owner.
 - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
 - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.
- B. Protection of persons and property:
 - 1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
 - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.
- C. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- D. Maintain access to adjacent areas at all times.

2.10 EXCAVATING

- A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades, and elevations indicated and specified herein.
- B. Removal of existing topsoil / grass sod:
 1. After the areas have been cleared of the existing topsoil / grass sod (8" depth, minimum) the area shall be proofrolled to evaluate the soil conditions. The proofrolling shall be observed by a Geotech engineer (GT). The GT shall make recommendations to proceed, or not with the undercutting.
- C. Undercutting: The following undercutting shall be performed after top soil and/or existing paving is removed:
 1. At the Building Addition: Undercut the existing soils to an elevation that is two feet (2'-0") below the existing elevation(s).
 2. At the Parking Lots and Drives: Undercut the existing soils to an elevation which is two feet (2'-0") below the existing grades, throughout the existing parking lot and drive areas.
 3. Undercut includes the building areas and five feet (5') beyond all exterior walls, but do not cross property lines or **existing building footings/foundations, and includes 5' beyond curb lines at parking lots and drives.**
 4. **After removal of the existing topsoil and grass sod, and before undercutting and placing any fills, the exposed subgrade at all locations shall be proofrolled to evaluate its performance. Proofrolling shall consist of overlapping passes with a rubber-tired construction vehicle weighing at least 25 tons, such as a loaded scraper or tandem-axle dump truck. The geotechnical engineer or representative thereof, shall observe subgrade performance during the proofrolling procedure, and instruct undercutting to proceed as stated above, or be modified accordingly.**
 5. Fill shall be placed in loose lifts not exceeding 8 inches in thickness. The fill shall be compacted with a moisture content equal to or slightly above the material's optimum moisture content determined in accordance with the standard Proctor procedure (ASTM D-698). Each lift shall be compacted to at least 95 percent of the material's maximum laboratory dry density (ASTM D-698).
 6. The recommended moisture content shall be maintained in the subgrade and fills, until fills are completed and floor slabs are constructed.
 7. All fill shall consist of approved low volume change material, be 100% free of organics having a plasticity index of 8 to 15, have a maximum particle size of 3", and containing at least 15 percent fines (material passing the No. 200 sieve, based on dry weight).
 8. **Procedures for undercutting (not depths) and installation of fill materials shall follow the information as provided by the Geotechnical Engineer.**
- D. Surplus materials:
 1. Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material, away from the site at disposal areas arranged and paid for by the Contractor.
- E. Testing and Geotechnical Engineer observation shall occur as a minimum:
 1. Inspection of existing subgrade prior to placement of any fill.
 - a. Compaction Testing Quantity - Building Area Subgrade:
 2. Cut Areas: 1 Test / 2,500 square footage
 3. Fill Areas: 1 Test / 2,500 square footage
 - a. Compaction Testing Quantity - Parking and Drives Subgrade:
 - 1) Cut Areas: 1 Test / 10,000 square footage
 4. Fill Areas: 1 Test / 10,00 square footage for each 8" lift.
 5. Testing of engineered fills during each lift of soil.
 6. Foundation excavations, prior to placement of any concrete within spread footing excavations.
 7. Undercutting operations.

- F. Testing and Geotechnical Engineer observation shall occur:
1. Inspection of existing subgrade prior to placement of any fill.
 2. Testing of engineered fills during each lift of soil.
 3. **Testing of Foundation excavations, before placement of concrete.**
 4. Undercutting and fill operations.
- G. EXCAVATION OF ROCK
1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures whether on or off the site.
 2. Do not use explosives without written permission from the Architect.
 3. **Rock excavation for all Earth Moving work and any/all underground work , as shown/ stated in the construction documents shall be a part of the Base Bid.**
- H. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- I. Borrow:
1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor.
- J. Ditches and gutter:
1. Cut accurately to the cross sections, grades, and elevations shown.
 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the Work.
- K. Unauthorized excavation:
1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Architect or the soil engineer.
 2. Under footings, foundations, or retaining walls:
 - a. Fill unauthorized excavations by extending the indicated bottom, elevation of the footing or base to the excavation bottom, without altering the required top elevation.
 - b. When acceptable to the Architect, lean concrete fill may be used to bring the bottom elevation to proper position.
 3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the soil engineer.
- L. Stability of excavations:
1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the soil engineer.
 2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
 3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- M. Shoring and bracing:
1. Provide materials for shoring and bracing as may be necessary for safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
 2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
 3. Carry shoring and bracing down as excavation progresses.
- N. Excavating for structures:
1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft, and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required, and for inspection.
 2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
 - a. Excavate by hand tools to final grade just before concrete is placed.
 - b. Trim bottoms to required lines and grades to leave solid base to receive concrete.

3. Excavate for footings and foundations only after general site excavating, filling, and grading are complete.
- O. Excavating for pavements:
 1. Cut surface under pavements to comply with cross sections, elevations, and grades.
- P. Cold weather protection:
 1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

2.11 FILLING AND BACKFILLING

- A. General: For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
 1. In excavations:
 - a. Use satisfactory borrow material.
 2. Under concrete, asphalt and aggregate pavements:
 - a. Use select fill materials from lowest elevation (excavation/undercut) up to base course materials as shown on the Drawings.
 - b. Use base course materials as described in the Drawings.
 3. Under building slabs:
 - a. Use select fill materials from lowest elevation (excavation/undercut) up to drainage fill.
 - b. Use drainage fill, 4" minimum, directly under building concrete slabs.
- B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.
 1. Acceptance of construction below finish grade including, where applicable, dampproofing and waterproofing.
 2. Inspecting, testing, approving, and recording locations of underground utilities.
 3. Removing concrete formwork.
 4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
 5. Removing trash and debris.
 6. Placement of horizontal bracing on horizontally supported walls.
- C. Ground surface preparation:
 1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious matter from ground surface prior to placement of fills.
 2. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
 3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- D. Placing and compacting:
 1. Place backfill and fill materials in layers not more than 8" in loose depth.
 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 3. Compact each layer to required percentage of maximum density for area. See paragraph 3.6.
 4. Place backfill and fill materials evenly adjacent to structures, to required elevations.
 5. Take care to prevent sedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

2.12 GRADING

- A. General
 1. Uniformly grade the areas within limits of construction including adjacent transition areas.
 2. Smooth the finished surfaces within specified tolerance.
 3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
 4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition defeats positive control of drainage.

- B. Grading outside building lines:
 - 1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.
 - 2. Finish the surfaces to be free from irregular surface changes, and:
 - a. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft. above or below the required subgrade elevation.
 - b. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.05 ft above or below the required subgrade elevation.

2.13 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined in accordance with Standard Proctor Test.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content of the actual density of each layer of soil material in place, as described in the Geotechnical Investigation Report and as approved by the Geotechnical Engineer.
 - 1. Structures: (Building foundations and slabs)
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 100% of maximum density.
 - 2. Lawn and unpaved areas:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum density.
 - 3. Walks: (Concrete, asphalt or other material noted on Drawings.)
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum density.
 - 4. Pavements: (Concrete, asphalt or other material noted on Drawings.)
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 100% of maximum density. Compact base course to 100%.
- C. Moisture control:
 - 1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
 - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
 - 3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the soil engineer.

2.14 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
 - 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed and compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

2.15 MEASUREMENT & PAYMENT

- A. Include within the Contract Sum/base bid an amount sufficient to cover all costs for work of this Section.
- B. Unit Prices
 - 1. Elevations to the bottom of the concrete footings, building slabs and pavement are shown on the Drawings. The extent of undercutting is noted in this Section of the Specifications. The Base Proposal shall be made based on these elevations. If, in order to obtain suitable bearing for the building foundation, building slab, paving or lawn areas, it is necessary to further undercut (or perform less undercutting) an adjustment in the Contract will be made on the basis of unit prices. Any adjustment in the contract will be based on the total cubic yardage of earthwork done compared to that shown in the Contract Documents.
 - 2. Unit Price #1 - Excavation, Filling, Compacting: Bidders shall state in their proposals the amount per cubic yard to be added to or deducted from the Contract Sum on account of an increase or decrease in the Work. Such amounts will include the costs of excavating, filling, compaction, overhead, and profit. Only one price will be accepted and it shall apply to both increases and decreases in total volume. Should this Unit Price be required for the completion of the Work, the cubic yardage to determine any decrease or increase in the Contract amount shall be the removed cubic yardage and not the replaced and compacted cubic yardage.
 - 3. **Before any additional undercutting occurs, the Contractor shall provide elevations of existing grades and the proposed undercut grades. Once the additional undercutting is approved by the Owner and the work is performed, the Contractor shall supply the Owner and/or Architect with a complete topographic survey showing all existing grades and the final undercut grades.**

END OF SECTION

SECTION 312333 - EXCAVATION, TRENCHING & BACKFILLING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section covers the requirements and procedures for excavation and backfill relating to underground conduits.

1.2 QUALITY ASSURANCE

- A. Compaction shall be in accordance with Section 312600: Compaction Control and Testing.
- B. The Architect shall be the sole and final judge of suitability of all materials.
- C. Materials in question, pending test results, shall not be used in the work. The Contractor shall remove all materials that fail to meet the requirements of the specifications, whether in stockpiles or in place.
- D. Pipe bedding or trench backfill which does not meet the specification requirements shall be removed or recompacted until the requirements are satisfied.

1.3 PROTECTION

- A. Protection of Existing Improvements:
1. Protection shall be provided to prevent damage to existing improvements indicated to remain in place on the Owner's property and adjoining properties.
 2. Damaged improvements shall be restored to their original condition, as acceptable to parties having jurisdiction.
 3. Land areas outside the limits of permanent work performed under this contract shall be preserved in their present condition. The Contractor shall confine his construction activities to areas defined for work on the Drawings.
- B. Protection of Existing Utilities:
1. The Contractor shall verify all existing utility locations either shown or not shown on the Drawings.
 2. The Contractor shall immediately notify the Owner and applicable utility company of any damages to existing utilities.
 3. Repairs to damaged utilities shall be made in accordance with the requirements of the Owner and applicable utility company at no extra cost to the Owner.
 4. The Contractor shall coordinate with the Owner and the applicable utility company for shutoff of or connection to active utilities. Existing utility services shall not be interrupted except as authorized in writing by the Owner.
- C. Protection of Open Excavations: Barricades or other type protectors shall be provided in accordance with OSHA regulations.

1.4 JOB CONDITIONS

- A. Classification of Excavation:
1. No classification shall be made to differentiate the various surface and subsurface conditions the Contractor may encounter during his performance under this contract.
 2. It is the Contractor's sole responsibility to verify the site surface and subsurface conditions.
- B. Dewatering:
1. Trenching shall be performed in such manner that the trench and the area immediately surrounding the trench will be continually and effectively drained by gravity or temporary pumps.
 2. Water shall not be permitted to accumulate in trenches.

3. Trenches shall be drained by methods which prevent the softening of the pipe bedding.
- C. Shoring:
 1. Shoring, including sheet piling, shall be furnished and installed as necessary to protect workers, banks, adjacent paving, structures, and utilities. Comply with OSHA regulations.
 2. Shoring, bracing, and sheeting shall be removed as trenches are backfilled, in a manner to prevent caving.
- D. Blasting shall not be permitted.

PART 2 - PRODUCTS

2.1 BEDDING MATERIAL

- A. Fine Aggregate Bedding:
 1. Fine aggregate bedding shall meet the quality and grading requirements of AASHTO M29, Grading No. 1.
 2. In general, fine aggregate bedding shall consist of natural sand having hard, strong, durable particles free from deleterious substances and meeting the following gradation requirements:

<u>Sieve Designation</u>	<u>Mass Percent Passing</u>
3/8 inch	100
No. 4	95 - 100
No. 8	70 - 100
No. 16	40 - 80
No. 30	20 - 65
No. 50	7 - 40
No. 100	2 - 20
No. 200	0 - 10

- B. Coarse Aggregate Bedding:
 1. Coarse aggregate bedding shall meet the quality requirements of AASHTO M80, Class C; and the grading requirements of AASHTO M43, Size Number 67.
 2. In general, coarse aggregate bedding shall consist of a well-graded crushed stone, crushed stone, crushed gravel, or gravel having hard, strong durable particles free from deleterious substances and meeting the following gradation requirements:

<u>Sieve Designation</u>	<u>Mass Percent Passing</u>
1 inch	100
3/4 inch	90 - 100
3/8 inch	25 - 55
No. 4	0 - 10
No. 8	0 - 5

3. Coarse aggregate bedding used for fiberglass pipe shall meet the above requirements, except that 100% of the material shall pass the 3/4" sieve.

2.2 BACKFILL MATERIAL

- A. Select Soil Backfill
 1. Select soil backfill shall be soil or soil aggregate free of debris, roots, organic material, and frozen materials.
 - a. Initial backfill (to 12" above the top of pipe) shall be free of stones not passing a 1" sieve.
 - b. The remainder of the backfill shall be free of stones having a maximum dimension of 3" or more.
 - c. Initial backfill for fiberglass pipe shall be free of stones not passing a 3/4" sieve.
 2. Otherwise suitable material which is unsuitable due to excess moisture content will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration, or blending with other materials to the

satisfaction of the Owner.

3. Unsuitable materials shall include those materials that are determined by the Owner to be inadequate for providing a stable backfill.
4. Expansive clay soils shall be classified as unsuitable unless treated or mixed in a manner approved by the Owner.

B. Aggregate Subbase Backfill:

1. Aggregate subbase backfill shall meet the quality and grading requirements of AASHTO M147, Grading A, B, C, or D, except that the initial backfill (to 12" above the top of pipe) shall be free of stones not passing a 1" sieve.
2. In general, aggregate subbase backfill shall consist of a dense-graded aggregate having hard, strong, durable particles free from deleterious substances and meeting the following gradation requirements (except in the initial backfill):

<u>Sieve</u> <u>Designation</u>	<u>Grading A</u>	<u>Grading B</u>	<u>Grading C</u>	<u>Grading D</u>
2 inch	100	100	---	---
1 inch	---	75-95	100	100
3/8 inch	0-65	40-75	50-85	60-100
No. 4	25-55	30-60	35-65	50-85
No. 10	15-40	20-45	25-50	40-70
No. 40	8-20	15-30	15-30	25-45
No. 200	2-8	5-20	5-15	5-20

3. Initial backfill for fiberglass pipe shall be free of stones not passing a 3/4" sieve.

C. Concrete Slurry Backfill:

1. The slurry backfill shall consist of a mixture of sand, cement and flyash and shall be in a ratio of 3400lb:150lb:100lb. Slurry mixture shall be plant mixed slurry and have a minimum compressive strength of 300 psi at 28 days. The design of slurry mixture may be modified as required by the Architect and/or Engineer.

2.3 SELECTION OF BORROW MATERIAL

- A. Borrow material, if required, shall be selected to meet requirements and conditions of the particular backfill for which it is to be used.
- B. For borrow material obtained outside the limits of the project site, the Contractor shall obtain the right to procure material and shall pay all royalties and other charges involved.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 TRENCH EXCAVATION

- A. Trench excavation, regardless of material encountered, shall be performed to the depths indicated or as otherwise specified.
- B. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins.
- C. Excavated materials not required or suitable for backfill shall be removed and wasted as specified in Section 02220 - Earthwork.
- D. Excavation shall be made by open cut, with as little trench opened at one time as possible.
- E. Trench walls shall be vertical from the bottom of the trench to at least one foot above the top of the pipe. The remainder of the trench shall be excavated such that the walls are at a slope flat enough to prevent collapse of the trench. Shoring shall be used as necessary to protect workers, banks, adjacent paving, structures, and utilities. Comply with OSHA regulations.

F. Trench widths:

- 1. Trenches shall be wide enough to allow for the proper laying of pipes and conduits. Unless otherwise indicated on the Drawings, the bottom of the trench shall conform to the following (Use horizontal span for arch pipe, elliptical pipe, or other odd-shaped conduits):

<u>Size of Conduit (ID)</u> Internal Diameter or Horizontal Span	<u>Width of Trench (Maximum)</u>	
	Without Sheeting and Shoring	With Sheeting and Shoring
12 inch and smaller	24 inch	36 inch
15-21 inch inc.	ID + 12 inch	ID + 24 inch
24-30 inch inc.	ID + 18 inch	ID + 30 inch

- 2. Where only a small amount of sheeting and shoring is required, which will not interfere with the work, the maximum trench widths shall be the same as where no sheeting and shoring are required.

- G. Excavation for manholes, valves, and other appurtenances shall be sufficient to allow a minimum 12" clearance around the appurtenance. Comply with OSHA regulations.
- H. Wet or otherwise unstable materials encountered in the bottom of the trench shall be overexcavated to allow for construction of a stable pipe bedding. The overexcavation shall be backfilled with coarse aggregate bedding.

3.3 DEPTH OF BURY

- A. Unless otherwise indicated on the Drawings, trenches shall be excavated to a depth that will provide not less than the following cover over the top of the pipe or conduit from finished grade:
 - 1. Water Lines - 3 feet
 - 2. Roof Drains and Storm Drains - 3 feet
 - 3. Sanitary Sewers - 3 feet
 - 4. Gas Lines (Low Pressure) - 3 feet
 - 5. Electrical Duct Banks - 3 feet
 - 6. Direct Buried Electrical - 3 feet
- B. In addition to the above requirements, trenches shall be excavated to a depth that will avoid interference with other utilities.

3.4 PIPE BEDDING AND TRENCH BACKFILL

A. First-Class Bedding

- 1. FIRST-CLASS BEDDING SHALL BE USED FOR NEW AND/OR EXISTING PIPES AND CONDUITS UNDER PAVEMENTS (PARKING LOTS), DRIVEWAYS, CURBS, GUTTERS, STEPS, EQUIPMENT SLABS, BUILDING SLABS ON GRADE, AND SIMILAR USE AREAS.**
- 2. Circular Pipes**
 - a. Bedding: Coarse aggregate bedding shall be placed on the bottom of the trench prior to the installation of the pipe. Fine aggregate bedding shall be used for steel pipe with exterior coating. The bedding shall have a minimum thickness of one-fourth the outside pipe diameter or 6", whichever is greater. Hand or mechanical tamping shall be used to compact the bedding. The surface of the bedding shall be brought to a uniform grade during compaction. Bell holes shall be excavated prior to pipe installation to allow for unobstructed assembly of the joint and to assure that the pipe is fully bedded for its entire length.
 - b. Haunching: After the pipe has been installed, coarse aggregate bedding shall be placed to extend up the sides of the pipe to the horizontal centerline. Fine aggregate bedding shall be used for steel pipe with exterior coating. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer. Sufficient material shall be worked under the haunch of the pipe to provide adequate support. Precautions to prevent movement of the pipe during placing of the material under the pipe haunch shall be taken.
- 3. Initial Backfill**
 - a. Aggregate subbase backfill shall be placed from the top of the coarse aggregate bedding to 12" above the top of the pipe or conduit. Fine aggregate bedding material shall be used for initial backfill of steel pipe with exterior coating.
 - b. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer.
 - c. Initial backfill shall be placed simultaneously on both sides of the pipe to prevent displacement.
- 4. Final Backfill**
 - a. **Trenches shall not be backfilled until required pressure tests are performed.**
 - b. **Trenches shall be backfilled with concrete slurry from the top of all pipes and brought to the subgrade elevation required for surface course construction.**
 - c. **Concrete Slurry Backfill shall be placed for the full width and depth of the trench and vibrated into place.**

B. Ordinary Bedding

1. Ordinary bedding shall be used for pipes and conduits where first-class bedding is not required.
- 2. Circular Pipes**
 - a. Bedding: Coarse aggregate bedding shall be placed on the bottom of the trench prior to the installation of the pipe. Fine aggregate bedding shall be used for steel pipe with exterior coating. The bedding shall have a minimum thickness of one-eighth the outside pipe diameter or 4", whichever is greater. Hand or mechanical tamping shall be used to compact the bedding. The surface of the bedding shall be brought to a uniform grade during compaction. Bell holes shall be excavated prior to pipe installation to allow for unobstructed assembly of the joint and to assure that the pipe is fully bedded for its entire length.
 - b. Haunching: After the pipe has been installed, coarse aggregate bedding shall be placed to extend up the sides of the pipe one-sixth of the outside pipe diameter. Fine aggregate bedding shall be used for steel pipe with exterior coating. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer. Sufficient material shall be worked under the haunch of the pipe to provide adequate side support. Precautions to prevent movement of the pipe during placing of the material under the pipe haunch shall be taken.
- 3. Initial Backfill**
 - a. Select soil backfill shall be placed from the top of the haunching to 6" above the top of the pipe or conduit. Fine aggregate bedding material shall be used for initial backfill for steel pipe with exterior coating.

- b. Each lift shall not exceed 6" and shall be compacted by hand. Mechanical tamping may be used except when installing plastic or fiberglass pipe or when use of mechanical tampers is not recommended by the pipe manufacturer.
- c. Initial backfill shall be placed simultaneously on both sides of the pipe to prevent displacement.
- 4. Final Backfill
 - a. Trenches shall not be backfilled until required pressure tests are performed.
 - b. Trenches shall be backfilled with select soil backfill and brought to the subgrade elevation required for surface construction or topsoiling.
 - c. Backfill shall be placed in successive horizontal layers of 8" to 12" in loose depth for the full width of the trench and compacted.
 - d. Rolling equipment shall not be used until a minimum of 2' of backfill material has been placed over the top of the pipe. If a hydro hammer is used to compact the backfill, a minimum of 3' of cover is required.
- C. Backfill Around Structures and Appurtenances
 - 1. Backfill around manholes, inlets and similar structures shall conform to Section 02220 - Earthwork: (Structure Excavation and Backfill) except that structures located in pavements, driveways, curbs, gutters, steps, equipment slabs, building slabs on grade, and similar use areas shall be backfilled with aggregate subbase backfill.
 - 2. Backfill around fire hydrants, valves, cleanouts, and similar appurtenances shall conform to trench backfill requirements, except as modified on the Drawings.

3.5 COMPACTION

- A. For backfill compaction densities and moisture contents, see Section 312600: Compaction Control and Testing.

END OF SECTION

SECTION 312600 - COMPACTION CONTROL AND TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section covers the requirements and procedures for compaction control and testing of soils to be performed and paid for by the Contractor.

1.2 DEFINITIONS

- A. Cohesionless Materials:
 - 1. Cohesionless materials shall be clean, free-draining variously graded gravels and sands with little or no fines. The portion passing the No. 200 sieve shall be limited to 12% and have a plasticity index of 0.
 - 2. Cohesionless materials shall be classified according to ASTM D2487 as GW, GP, SW or SP.
- B. Cohesive Materials:
 - 1. Cohesive materials shall be classified according to ASTM D2487 as GM, GC, SM, SC, CL or CH.
 - 2. Materials classified according to ASTM D2487 as ML, OL, MH, OH and PT shall be unsatisfactory.

1.3 QUALITY ASSURANCE

- A. Test Specifications
 - 1. Laboratory Tests
 - a. Moisture - Density relations of soils (Proctor test) - AASHTO T99, Method C or D.
 - b. Liquid limit of soils - AASHTO T89.
 - c. Plastic limit and plasticity index of soils - AASHTO T90.
 - d. Particle size analysis of soils (gradation test) - AASHTO T88.
 - 2. Field Tests
 - a. Density of soil and soil aggregate in-place by nuclear methods - AASHTO T238, Method B (direct transmission).
- B. Laboratory Tests Required
 - 1. The following tests shall be performed for each principal type of material or combination of materials encountered or utilized.
 - a. Proctor test
 - b. Liquid limit test
 - c. Plastic limit test (and determination of plasticity index)
 - d. Gradation test
 - 2. The tests listed above shall be performed on additional samples as directed by the Architect.
 - 3. Results of these tests shall be the basis of control for compaction.
- C. Field Tests Required
 - 1. Compaction Test Quantity - Building Area Subgrade:
 - a. Cut Areas: 1 Test / 2,500 square footage
 - b. Fill Areas: 1 Test / 2,500 square footage
 - 2. Compaction Test Quantity - Parking and Drives Subgrade:
 - a. Cut Areas: 1 Test / 5,000 square footage
 - b. Fill Areas: 1 Test / 5,000 square footage for each 8" lift.
 - 3. Trench Excavation and Backfilling
 - a. One (1) in-place density test and one (1) in-place moisture test per 100 linear feet of trench per lift under structures and paved areas.
 - b. One (1) in-place density test and one (1) in-place moisture test per 300 linear feet of trench per lift under grassed or nontraffic areas.
 - 4. Excavation, filling and raw subgrade preparation under grassed or nontraffic areas: One (1) in-place density test and one (1) in-place moisture test per 3,000 square yards per lift.

5. Additional in-place moisture-density tests and relative density tests shall be performed as directed by the Architect.
- D. Samples for laboratory and field tests shall be taken at locations designated by the Architect.

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 COMPACTION

- A. Each lift shall be compacted to not less than the percentage of the maximum density specified below.

<u>Fill embankment, backfill, and trench backfill</u>	<u>Percent Minimum Dry Density (ASTM-698, Standard Proctor)</u>
Under equipment slabs, building slabs-on-grade and other structures:	<u>98</u>
Under pavement, concrete walks, driveways, curbs, gutters, steps, and similar use areas (including adjacent shoulder areas):	<u>95</u>
Under grassed or landscaped areas:	<u>85</u>

- B. Moisture Content
1. Each lift of fill, embankment, backfill and trench backfill under pavement, driveways, curbs, gutters, steps, sidewalks, grassed or landscaped areas, and similar use areas (including adjacent shoulder areas) shall be compacted at a moisture content 1% below to 4% above optimum moisture.
 2. Each lift of fill, embankment, backfill and trench backfill under equipment slabs, building slabs-on-grade, and other structures shall be compacted at a moisture content 1% to 4% above optimum moisture.
 3. Subgrades shall be compacted at a moisture content 1% to 4% above optimum moisture.

3.3 COMPACTION DEFICIENCIES

- A. The Owner shall be the final judge of suitability of all compaction.
- B. Apparent negligence or carelessness during any portion of the earthwork operations will require that additional tests be performed on that portion of the work.
- C. Fills, embankments, backfills, trench backfills or subgrades that do not meet the specification requirements shall be removed or recompacted until the requirements are satisfied.

END OF SECTION

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide soil poisoning to control subterranean termites as specified herein and needed for a complete and proper treatment. **At all new concrete slabs on grade at the building addition, including those which are within the existing building and those "under roof," but not within the heated/cooled area of the building.**
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Qualifications of subcontractor:
 - 1. Properly licensed to provide such services by governmental agencies having jurisdiction.
 - 2. Not less than five years successful experience in soil treatment for subterranean termites.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications, Sample Warranty and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 WARRANTY

- A. Upon completion of the Work, and as a condition of its acceptance, deliver to the Architect two copies of a Warranty signed by an authorized representative of the installing subcontractor, and co-signed by the Contractor, agreeing:
 - 1. To make an inspection of the Work once each year for a total period of five years following Date of Substantial Completion for the purpose of detecting termite infestation;
 - 2. If termite infestation is found during that five year period, to retreat in accordance with prevailing practices of the trade and within ten calendar days after such infestation is discovered;
 - 3. To repair damage to the Work caused by subterranean termites during that five year period, to a maximum cost of \$5,000;
 - 4. To make such inspections, retreatment, and repairs at no additional cost to the Owner.
- B. Cost for all Warranty items shall be a part of the Base Bid.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. To the extent approved by governmental agencies having jurisdiction, use working solutions containing the following chemical at the listed minimum concentration:
 - 1. Dragnet SFR Termiticide/Insecticide; active ingredient: Permethrin. Meeting U>S OSHA Hazard Communication Standard 29 CFR 1910. 1200.
- B. If combinations of toxicants are approved by governmental agencies having jurisdiction, provide toxicants having such approval and in the maximum strength so approved, at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 APPLICATION: Apply as per manufacturer's instructions if in conflict with information stated below.

- A. Begin soil poisoning only after all preparation for slab placement is complete.
- B. Slabs on grade:
 - 1. Apply toxicant as an overall treatment at the minimum rate of one gallon of toxicant to each 10 square feet of area under slabs on grade within building lines.
- C. Utility entrances:
 - 1. Apply toxicant at the rate of two gallons of toxicant per five lineal feet at critical locations such as where utilities pass through exterior walls and through floor slabs.
 - 2. Extend treatment not less than 48" from wall into trench.
- D. Walls:
 - 1. Apply toxicant at the rate of two gallons of toxicant per five lineal feet along both sides of all foundation walls, cross walls, and grade beams, after all nearby excavation has been completed.
 - 2. Apply toxicant at the rate of one gallon of toxicant per five lineal feet to voids in masonry walls.
- E. Miscellaneous: Apply toxicant at the rate of two gallons of toxicant per five lineal feet at the following areas:
 - 1. Immediately below expansion joints, control joints, and all areas where slab will be penetrated by construction features.
 - 2. Where exterior facings or veneers extend below grade level along the exterior side of all foundation walls.
 - 3. Where unit masonry foundation construction is used.
- F. If soil is disturbed after treatment, retreat disturbed areas.

END OF SECTION

SECTION 318000 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY.

- A. Section Includes:
 - 1. Temporary and permanent erosion control systems.
 - 2. Slope protection systems.
- B. Related Work: Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Certificates, signed by the material producer and the asphalt paving subcontractor, stating that materials meet or exceed the specified requirements.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Quick Growing Grasses: Wheat, rye, or oats.
- B. Straw Bales: Free of weed seed.
- C. Fencing for Siltation Control: Geotextile filter fabric, 24" HT., (Minimum) on steel or wood stakes at 6' to 8' apart.
- D. Erosion Control Blankets and/or Erosion Control Geotextiles: 100% Biodegradable straw / cotton, 8' width x lengths required.
- E. Bale Stakes:
 - 1. Minimum 4 feet length.
 - 2. 2 No. 4 steel reinforcing bars or,
 - 3. 2 steel pickets or,
 - 4. 2 - 2x2 inch hardwood stakes driven 18 inches to 24 inches into ground.
- F. Temporary Mulches: Loose straw, netting, wood cellulose, or agricultural silage free of seed.
- G. Metal Fence Stakes: Minimum 8 foot length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor and/or Construction Manager accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. If such is prepared by the Owner, the Contractor and/or Construction Manager shall Review Owner's Stormwater Pollution Prevention Plan (SWP³).
- B. Notify Architect of deficiencies or changes in Stormwater Pollution Prevention Plan (SWP³) required by current site conditions. Revisions of plan will be made as determined by Architect.

3.3 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. The Owner, ADEQ, and/or Architect may direct Contractor and/or Construction Manager to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor and/or Construction Manager to provide immediate permanent or temporary pollution control measures.
- B. 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.
- C. Maintain temporary erosion control systems, to control siltation, at all times throughout Work. Provide maintenance or additional Work directed by Owner or Architect within 48 hours of notification by Owner or Architect.
- D. Apply erosion control blankets and/or geotextiles or sod slopes, that may be easily eroded, with wheat, rye or oat grasses.

END OF SECTION

SECTION 321313 - CONCRETE PAVING AND PAVEMENT MARKING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide portland cement concrete paving and marking of paving, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 033000 - Cast-In-Place Concrete

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The Contractor shall furnish to the Architect a copy of the proposed concrete proportions, aggregate quality tests and test cylinder results from the proposed mix design. The test results shall include both compression tests and third-point flexure tests from the proposed mix or from a similar mix with known proportions verified by a Professional Engineer.
- C. Concrete shall not be batched until the mix design and all admixtures have been approved by the Architect. All concrete shall be batched, mixed and delivered in accordance with ASTM C94. The Architect shall have access to the mixing plant at all times to check materials, proportions and equipment.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 013400.
- B. Product data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements of items listed in Part 2 - Products.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 016400.

PART 2 - PRODUCTS

2.1 FORMS

- A. Provide wood or metal formwork, including adequate bracing to the lines and grades shown on the Drawings. Forms shall be set to insure a finished product with a vertical tolerance of 1/4" per 10 linear feet and a horizontal alignment tolerance of 1/2."
- B. Earth forms will not be permitted for paving.

2.2 JOINTS

- A. Preformed joint material: Nonextruded, resilient bituminous type filler conforming to ASTM D1751.
- B. Joint sealer: Sonneborn/Renord, SL-1, one part self-leveling polyurethane sealant, or equal..

2.3 CONCRETE

- A. Comply with the following as minimums:
 - 1. Portland cement: ASTM C 150, Type I.
 - 2. Aggregate, coarse: Clean, crushed stone or gravel meeting the requirements of ASTM C33.
 - 3. Aggregate, fine: Natural sand which is clean, well graded and conforms to the requirements of ASTM C33.
 - 4. Water: Clean and potable.
- B. Concrete shall have a 28-day compressive strength of 4,000 psi (unless noted otherwise on Drawings). Paving slabs and other exterior concrete shall contain 5% ($\pm 1\%$) entrained air. Slump shall be 2 to 4 inches.
- C. Concrete thickness shall be as shown on the Drawings. **IF NOT SHOWN, IT SHALL BE 8" AT ALL AREAS SHOWN TO RECEIVE CONCRETE PAVING.**

2.4 CRUSHED STONE BASE

- A. Crushed Stone Base meeting the requirements of AHTD Class 7 material.

2.5 CURING COMPOUND

- A. Curing compound: Shall be white pigmented, liquid membrane forming material conforming to ASTM C309, Type 2.

2.6 ADMIXTURES

- A. Air-entraining admixture shall conform to ASTM C260.

2.7 PAVEMENT MARKING PAINT

- A. Provide paint specifically formulated for use as pavement marking in automobile parking area, in the color selected by the Architect from standard colors of the approved manufacturer.
- B. Acceptable products:
 - 1. "Traffic Paint" manufactured by J.E. Bauer Company.
 - 2. "Traffic Paint" manufactured by Tnemec.
 - 3. "Romark Traffic" manufactured by Glidden-Durkee.
 - 4. "Traffic and Zone Marking Paint" manufactured by PPG.

2.8 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.0 GENERAL

- A. Strictly conform to the stated requirements of the Pavement Recommendations of the Geotechnical Investigation Report as a minimum.

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SURFACE CONDITIONS

- A. Concrete meeting the requirements of these specifications shall be placed on a wetted and approved subgrade. No concrete shall ever be placed on frozen subgrade.

3.3 INSTALLATION

- A. Upon completion of surface preparation and formwork, transit mix the concrete in accordance with provisions of ASTM C94.
 - 1. With each load, provide ticket certifying to the materials and quantities and to compliance with the approved mix design.
 - 2. On the transit-mix ticket, state the time water was first added to the mix.
 - 3. At the batch plant, withhold 2-1/2 gal of water per cu yd of concrete.
 - 4. Upon arrival at the job site, and as directed by the testing laboratory inspector, add all of part of the withheld water before the concrete is discharged from the mixer.
 - 5. Mix not less than five minutes after the withheld water has been added, and not less than one minute of that time immediately prior to discharge of the batch.
 - 6. Unless otherwise directed, provide 15 minutes total mixing time per batch after first addition of water.
- B. Do not use concrete that has stood over 30 minutes after leaving the mixer, or concrete that is not placed within 60 minutes after water is introduced into the mix.
- C. Conveying:
 - 1. Place concrete in accordance with the following and pertinent recommendations contained in ACI 304.
 - 2. Deposit concrete continuously in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section.
 - 3. If a section cannot be placed continuously, provide construction joints as specified herein.
 - 4. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
 - 5. Deposit concrete as nearly as practicable in its final location so as to avoid segregation due to rehandling and flowing.
 - 6. Do not subject concrete to any procedure which will cause segregation.
 - 7. Do not use concrete which becomes non-plastic and unworkable, or does not meet quality control limits, or has been contaminated by foreign materials.
 - 8. Concrete shall be thoroughly consolidated against and along the faces of all forms, concrete gutters and along the full length and on both sides of all joint assemblies. Vibrators shall not be permitted to come in contact with a joint assembly, the grade or a side form. The vibrator shall never be operated longer than 15 seconds in any one location.
- D. Deposit and consolidate concrete in a continuous operation within the limits of construction joints until the placing of a panel or section is completed.
 - 1. Bring surfaces to the correct level with a straight-edge, and then strike off.
 - 2. Use bullfloats or darbies to smooth the surface, leaving it free from bumps and hollows.
 - 3. Do not sprinkle water on the plastic surface. Do not disturb the surfaces prior to start of finishing operations.

E. Jointing:

1. Expansion joints:
 - a. Do not permit reinforcement to extend continuously through any expansion joint.
 - b. Locate expansion joints where indicated on drawings (12' o.c. maximum if not indicated on drawings.) or as directed by Architect, filled to full depth with expansion joint material.
 - c. In curbs, locate 1/2" thick joint at the beginning and end of curves and at 24'-0" centers elsewhere. Joints in curbs shall align with joints in pavement wherever possible.
 - d. In curbs and paving, hold down 1/2" and seal exposed joints with joint sealer.
2. Construction joints:
 - a. Shall be placed wherever the placing of concrete is temporarily suspended for more than 30 minutes. These joints shall be constructed as shown on the Drawings.
 - b. Every effort shall be made to use expansion joints and contraction joint locations as construction joint locations.
3. Contraction joints:
 - a. Shall be nominally spaced as shown on the Drawings. The maximum spacing of any joint shall be 12 feet o.c. whether or not shown on the drawings.

F. Finishing:

1. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
2. During or after the first floating, check the planeness of surface with a ten foot straight-edge applied at not less than two different angles.
3. Cut down high spots and fill low spots, and produce a surface level within 1/4" in ten feet as determined by a ten foot straight-edge placed anywhere on the surface in any direction.
4. Refloat the surface immediately to a uniform sandy texture.
5. Construction joints shall be constructed while the concrete is in its plastic state prior to final finishing. A jointing tool which will allow a groove equal to one-third the slab thickness in depth and 1/4-inch in width shall be utilized to form the joint.
6. While the surface is still plastic, provide a textured finish by drawing a fiber bristle broom uniformly over the surface.
 - a. Unless otherwise directed by the Architect, provide the texturing in one direction only.
 - b. Provide "medium" texturing unless otherwise directed by the Architect.
7. Before final finishing is completed and before the concrete has taken its initial set, the edges of the pavement slab at form lines and expansion joints and the curb shall be carefully finished with an edger having a 1/8" radius.

G. Stamped Concrete (If Shown/Noted on the Drawings)

1. Install system as per manufacturer's written instructions.
2. Coordinate stencil layout and color(s) of additives with Architect.

H. Pavement Marking:

1. Provide marking of new paving as directed by the Architect.
2. Secure the approval of the Architect of the graphic design and layout prior to start of application.
3. Using proper masking, stencils and application equipment recommended for the purpose by the manufacturer of the approved paint, apply paint in strict accordance with manufacturer's recommendations.
4. Provide traffic cones, barricades and other devices needed to protect the paint until it is sufficiently dry to withstand traffic.
5. Cleanup: When paint is thoroughly dry, visually inspect the entire application, and:
 - a. Touch up as required to provide clean, straight lines and surfaces throughout.
 - b. Using a permanently opaque paint identical in color to the concrete paving, block out and eliminate all traces of splashed, tracked and/or spilled pavement marking paint from the background surface.

3.4 CONCRETE CURB AND GUTTER

- A. **SUBGRADE PREPARATION.** Subgrade preparation shall be as specified in other sections of these specifications.
- B. **FORMS.** Forms shall be of metal or wood, free from warp, of sufficient strength to resist springing during the process of depositing concrete. They shall be securely set, staked and braced to the required line and grade. All forms shall be cleaned and oiled before concrete is placed against them.
- C. **PLACING and FINISHING.** Curb and gutter shall be constructed to the line and grade and in accordance with the detail shown on the plans.
Mixing, placement and finishing of concrete shall conform to Section 401 of these specifications.

The subgrade shall be moistened immediately prior to placing of the concrete. Concrete shall be placed in the forms and shall be thoroughly consolidated until all voids are removed. Edges along the forms shall be spaded to prevent honeycomb. Face forms shall be stripped as soon as the concrete has set sufficiently. Exposed surfaces of the curb and gutter section shall be trowelled to a smooth and even surface and shall be given a light broom finish applied parallel to the longitudinal axis of the curb and gutter.

Construction of curb and gutter at storm drainage inlets shall conform to the details shown on the plans and as specified in other sections of these specifications.

D. JOINTS

- 1. **EXPANSION JOINTS.** Expansion joints shall be provided at the locations shown on the plans. The performed expansion joint material shall have a thickness of ½" and shall be installed the full depth of the curb and gutter, except the top of the joint filter shall be placed ½" below the surface. All transverse expansion joints shall be of a single section of the preformed material. The top ½" of the joint shall be filled with the specified joint sealer.
- 2. **CONTRACTION JOINTS.** Contraction joints shall be placed at 20' intervals. The joints shall be constructed using jointing tools or by sawing. Joint tools shall have a minimum bit of 1", a maximum width of 1/4" and rounded edges. Saw cuts shall have a minimum depth of 1" and a width of 1/4". Joints shall be constructed at right angles to the curb line.

The tooled or sawed joint shall be filled with the specified joint sealer.

- E. **SURFACE TEST.** The surface of the curb and gutter shall be checked with a 10 foot straight edge. The maximum variation shall not exceed 1/4" in 10 feet. Curb and gutter which has a surface variation exceeding the specified limit shall be removed and replaced at the expense of the Contractor.
- F. **CURING.** The concrete curb and gutter shall be cured with a liquid membrane curing compound as specified in Section 401 of these specifications. Pedestrian and vehicular traffic shall be excluded from the use of the concrete for at least 72 hours.
- G. **BACKFILL.** After the concrete has set sufficiently, the area behind the curb shall be backfilled. Backfill material, placement and compaction shall be as specified in other sections of these specifications.

3.5 CURING AND PROTECTION

- A. Immediately after the finishing operations have been completed and marring of the concrete will not occur, the entire exposed surface of the newly placed concrete shall be coated and sealed with a uniform layer of membrane curing compound, in accordance with the manufacturer's recommendations. In no case shall the coverage exceed 150 square feet per gallon.
- B. When forms are removed, the sides of the slab shall receive a similar coating of the curing compound membrane. Contraction joints shall also be sprayed with a coating of the curing compound.

- C. Protection against rain: Contractor shall provide all necessary protections to protect the surface of the unhardened concrete.
- D. Cold weather protection: Concreting shall cease when the descending air temperature in the shade and away from artificial heat falls below 40 degrees F. Concrete shall be protected from freezing temperatures until it is at least 10 days old. Protection shall consist of providing straw, hay, insulating curing blankets or other suitable material.

3.6 SEALING JOINTS (Seal all joints listed in Paragraph 3.3.E, above)

- A. Joints to be sealed shall be filled with the specified sealing compounds. The joint sealing material shall be applied before the pavement is opened to traffic and as soon after the completion of the curing period is feasible.
- B. All recommendations of the joint sealer manufacturer shall be followed. The Contractor shall submit the Architect with a copy of the recommended application procedure not less than ten (10) days before sealing is to begin.
- C. Just before sealing, each joint shall be thoroughly cleaned of all foreign material, including membrane curing compound, and joint faces shall be clean and surface-dry when sealer is applied. Hot applied material shall be stirred during heating to prevent localized overheating.
- D. The sealing material shall be applied to each joint in accordance with the details shown on the Drawings or as directed by the Architect. The joint filling shall be done without spilling material on the exposed surfaces of the concrete. Any excess material on the surface of the concrete pavement shall be removed immediately and the pavement surface cleaned. The use of sand or similar material to cover the seal shall not be permitted. Joint sealing material shall not be placed when the air temperature in the shade is less than 50 degrees F., unless approved by the Architect.

END OF SECTION

SECTION 32 91 20 - LANDSCAPE WORK (TOPSOIL AND SOD)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of landscape development work is shown on the Drawings and shall be a part of the Base Bid.

1.2 QUALITY ASSURANCE

- A. Subcontract landscape work to a single firm specializing in landscape work.
- 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 to Owner, together with proposal for use of equivalent material.
- D. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

1.3 SUBMITTALS

- A. Certification: Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.
- 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 Instructions: 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(s).

1.4 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Sod: Time delivery so that sod will be placed within 24 hours after stripping. Protect sod against drying and breaking of rolled strips. Cover with plastic sheets when transporting. Store sod at job site in shady location and add moisture as required.
- C. Do not remove container grown stock from containers until planting time.

1.5 JOB CONDITIONS

- A. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.
- B. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. Familiarize with sprinkler system lines.
- C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage

conditions, or obstructions, notify Owner before planting.

- D. Planting Time: Plant or install materials during normal planting seasons for each type of landscape work required. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

1.6 SPECIAL PROJECT WARRANTY

- A. Warranty lawns for a period of one year after date of final acceptance by the Owner, against defects including death and unsatisfactory growth, except from defects resulting from neglect by Owner, abuse or damaged by others, or unusual phenomena or incidents which are beyond the Contractor's control. The Contractor shall replace dead or unsatisfactory growth at the expense of the Contractor.
- B. Remove and replace sod found to be dead or in unhealthy conditions during warranty period. Make replacements during planting season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of Owner, it is advisable to extend warranty period for a full growing season.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Provide new topsoil which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.
 - 1. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 12"; do not obtain from bogs or marshes.
- B. All topsoil shall be a part of the Base Bid and is not a part of the Allowance.

2.2 SOIL AMENDMENTS

- A. Lime: Natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates, ground so that not less than 90% passes a 10-mesh sieve and not less than 50% passes a 100-mesh sieve.
- B. Aluminum Sulfate: Commercial grade.
- C. Bonemeal: Commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.
- D. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.
- E. Sand: Clean, washed sand, free of toxic materials.
- F. Perlite: Conforming to National Bureau of Standards PS 23.
- G. Vermiculite: Horticultural grade, free of toxic substances.
- H. Sawdust: Rotted sawdust, free of chips, stones, sticks, soil or toxic substances and with 7.5 lbs. nitrogen uniformly mixed into each cubic yard of sawdust.
- I. Manure: Well rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

- J. Mulch: Organic mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants and consisting of the following:
 - 1. Shredded cyprus mulch
- K. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing the following percentages of available plant nutrients:
 - 1. For trees and shrubs, provide fertilizer with not less than 5% total nitrogen, 10% available phosphoric acid and 5% soluble potash.
 - 2. For lawns, provide fertilizer with percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 100 sq. ft. of lawn area and not less than 4% phosphoric acid and 2% potassium. Provide nitrogen in a form that will be available to lawn during initial period of growth; at least 50% of nitrogen to be organic form.

2.3 GRASS MATERIALS

- A. **Sod: At "Lawn" areas as noted on the Drawings and any existing area disturbed by the work/construction, 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" (plus or minus 1/4"), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).**
 - 1. 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.
 - 2. Provide sod composed principally of the following:
 - a. Bermuda grass (cynodon dactylon).

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps and other extraneous materials harmful or toxic to plant growth.
- B. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.
- C. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.
- D. For lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.
- E. Loosen subgrade of lawn areas to a minimum depth of 4". Remove stones over 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.
 - 1. Spread topsoil to minimum depth required to meet lines, grades and elevations shown after light rolling and natural settlement. Add specified soil amendments and mix thoroughly into upper 4" of topsoil.
 - 2. Place approximately 1/2 of total amount of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil. Add specified soil amendments and mix thoroughly into upper 4" of topsoil.
- F. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than 6"; apply soil amendments and initial fertilizers as specified; remove high areas and fill in depressions; till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

1. Prior to preparation of unchanged areas, remove existing grass.
 2. Allow for sod thickness in areas to be sodded.
 3. Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2" of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.
- G. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
- H. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.
- I. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.2 MAINTENANCE

- A. Begin maintenance immediately after planting.
- B. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.**
- 1. Sodded lawns, not less than 30 days after installation.**
- C. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

3.8 CLEANUP AND PROTECTION

- A. During landscape work, keep pavements clean and work area in an orderly condition.
- B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.9 INSPECTION AND ACCEPTANCE

- A. When landscape maintenance period is complete, the Owner and Contractor will make an inspection to determine final acceptance. This will begin the one (1) year warranty period specified by Paragraph 1.6, SPECIAL PROJECT WARRANTY.
- B. When landscape work is completed, the Owner and Contractor will make an inspection to determine acceptability. This will begin the maintenance periods specified by paragraph 3.7, MAINTENANCE.
- C. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Owner and found to be acceptable. Remove rejected plants and materials promptly from project site.

3.10 SCHEDULE OF PLANTING SOIL MIXTURE REQUIREMENTS:

- A. For lawn areas, provide not less than the following quantities of specified materials:
1. 1 part of loose peat humus to 5 parts of topsoil.
 2. 40 lbs. of bonemeal per 1000 sq. ft.
 3. 40 lbs. of commercial fertilizer per 1000 sq. ft.
- B. Add aluminum sulfate (to adjust ph of alkaline soils), sand, perlite, vermiculite, sawdust, manure or other appropriate soil amendments to above schedules depending on local conditions.

END OF SECTION

APPENDIX

A – ABBREVIATIONS

OZARKA COLLEGE
Melbourne, Arkansas

NEW TECHNICAL BUILDING
Aplus Project No.: 24-55

ABBREVIATIONS

A.B.	Anchor Bolt	EQ.	Equal
A/C	Air Conditioning (er)	EQUIP.	Equipment
AC.BD.	Acoustical Board	E.J.	Expansion Joint
AC.PL.	Acoustical Plaster	EXIST.	Existing
AC.T	Acoustical Tile	EXT.	Exterior
A.F.F.	Above Finished Floor		
ALUM.	Aluminum		
APPROX.	Approximate (ly)	F.A.	Fire Alarm
A.R.V.	Attic Relief Vent	F.D.	Floor Drain
		FND.	Foundation
BITUM.	Bituminous	F.E.(C)	Fire Extinguisher (Cabinet)
BLDG.	Building	F.F.E.	Finished Floor Elevation
BLK.(G)	Block (ing)	FIXT.	Fixture
BM.	Beam	FLSHG.	Flashing
B.M.	Bench Mark	F.P.Y.H.	Frost Proof Yard Hydrant
BOT.	Bottom	F.P.W.H.	Frost Proof Wall Hydrant
BRK.	Brick	F.S.	Far Side or Full Size
BRG.	Bearing		
B.U.M.	Back Up Material	GA.	Gauge
B.U.R.	Built-Up Roof	GALV.	Galvanized
		G.B.	Grade Beam or Grab Bar
C.I.	Cast Iron	GL.	Glass
C.	Conduit	GL.T.	Glazed Tile
CAB.	Cabinet	GYP.BD.	Gypsum Board
C.B.	Chalkboard		
C.T.	Ceramic Tile	H.B.	Hose Bibb
C/T.B.	Chalk and Tack Board	H.C.	Hollow Core
CLG.	Ceiling	H.D.	Hair Dryer
CLK.	Calk	HGT.	Height
C.J.	Construction Joint	H.M.	Hollow Metal
COL.	Column		
CONC.	Concrete	I.D.	Inside Diameter
CONT.	Continuous	INSUL.	Insulation
C.O.	Cleanout	INT.	Interior
C.O.T.G.	Cleanout to Grade		
CRS.	Course	JST.	Joist
DAMPFRFG.	Dampproofing	LAV.	Lavatory
DET.	Detail	L.W.C.	Light Weight Concrete
D.F.	Drinking Fountain		
DIA.	Diameter	MAX.	Maximum
DN.	Down	M.H.	Manhole
D.R.	Display Rail	MIN.	Minimum
D.S.	Downspout or Double Strength	M.O.	Masonry Opening
D.T.	Drapery Track	MTD.	Mounted
		MTL.	Metal
E.F.	Exhaust Fan		
ELEC.	Electrical	N.S.	Nelson Stud or Near Side
ELEV.	Elevation		
ENAM.	Enamel		

OZARKA COLLEGE
Melbourne, Arkansas

NEW TECHNICAL BUILDING
Aplus Project No.: 24-55

N.I.C.	Not in Contract	TYP.	Typical
N.T.S.	Not to Scale		
O.C.	On Center	U.O.N.	Unless Otherwise Noted
O.D.	Outside Diameter	UR.	Urinal
OPN'G.	Opening		
P.T.D.	Paper Towel Dispenser	V.	Vinyl
PART.	Partition	V.C.T.	Vinyl Composition Tile
PL.	Plaster	V.B.	Vapor Barrier
PLAS.LAM.	Plastic Laminate	V.T.	Vinyl Tile
PLYWD.	Plywood	V.T.R.	Vent Through Roof
P.P.	Power Pole	V.W.C.	Vinyl Wall Covering
P.S.	Projection Screen	W.C.	Water Closet
PT.	Paint	W.H.	Water Heater
		W.P.	Weather Proof
		W.W.M.	Welded Wire Mesh
		W/	With
		W/O	Without
Q.T.	Quarry Tile	WD.	Wood
R.	Radius or Riser		
R.A.G.	Return Air Grille		
R.D.	Roof Drain		
REINF.	Reinforcing		
REQ'D.	Required		
R.I.O.	Rough-in Only		
R.O.	Rough Opening		
R.T.U.	Roof Top Unit		
S.B.	Sand Blast		
S.N.D.	Sanitary Napkin Dispenser		
S.S.	Service Sink or Stainless Steel		
S.A.G.	Supply Air Grille		
S.C.	Solid Core		
SIM.	Similar		
SM.F.PL.	Smooth Finish Plaster		
SPEC(S).	Specifications		
S.F.PL.	Sand Finished Plaster		
SQ.	Square		
STL.	Steel		
STRUCT.	Structural		
SUSP.	Suspend (ed)		
S.D.	Soap Dispenser		
T.B.	Tack Board		
TEL.	Telephone		
T.C.	Time Clock or Top of Curb		
TER.	Terrazzo		
THRESH.	Threshold		
TLT.	Toilet		
T.P.D.	Toilet Paper Dispenser		
T.	Tread		

