

**PROJECT MANUAL
INCLUDING SPECIFICATIONS
FOR CONSTRUCTION**

**INDUSTRY TECHNOLOGY RENOVATION
Southern Arkansas University Tech
Camden, Arkansas**

**ARCHITECT PROJECT NO. 25060
DATE: October 23, 2025**



11225 HURON LANE • SUITE 104 • LITTLE ROCK, AR 72211

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NOTICE TO BIDDERS

INDUSTRY TECHNOLOGY RENOVATION SOUTHERN ARKANSAS UNIVERSITY TECH CAMDEN, ARKANSAS

Sealed proposals will be received on General Contract for INDUSTRY TECHNOLOGY RENOVATION, SOUTHERN ARKANSAS UNIVERSITY TECH, CAMDEN, ARKANSAS. The Owner will receive sealed proposals until 2:00 p.m., XXXXXXXX, 2025, at the Southern Arkansas University Tech Purchasing Office, 6251 Hussey Road, Camden, Arkansas, at which time they will be publicly read aloud. Any bids received after the stated time and opening date will be returned unopened.

The Proposed Contract Documents may be examined at the following locations:

Lewis, Elliott, McMorran, Vaden,
Ragsdale & Woodward, Inc. (Architect)
11225 Huron Lane, Suite 104
Little Rock, AR 72211

SAU Tech website:
<http://www.sautech.edu/invitation-to-bid>

Dodge Construction Network (DCN)
<http://Dodge.construction.com>

Construction Market Data, LLC
www.constructconnect.com

Southern Reprographics, Inc.
901 West 7th St.
Little Rock, AR 72201

General Contractors may secure copies of the Proposed Contract Documents from the Architect on the following basis:

Three sets of the Project Manual, including Specifications, plus three sets of Drawings upon payment of any costs of shipping and \$600 deposit. Deposit is completely refundable if all sets are returned to the Architect in good condition within five days after bid opening. General contractors who secure plans but do not submit legitimate bids shall forfeit their deposit.

Subcontractors and material suppliers may obtain additional copies of the Project Manual, including Specifications, plus additional sets of prints of the Drawings, upon payment of \$200 per set, nonrefundable.

No partial sets will be issued.

All bidders must be licensed in the State of Arkansas, as provided by Act 142 of 1967, amended by Act 293 of 1969, and Act 397 of 1971, and Act 546 of 1971, as enacted by the General Assembly of the State of Arkansas.

Bid proposals must be accompanied by a bidder's bond or cashier's check in the amount of five percent (5%) of the bid, made payable to the Southern Arkansas University Tech, Camden, Arkansas.

The successful bidder will be required to furnish satisfactory performance and payment bond using AIA Document A312.

The Owner reserves the right to waive any informality, or to reject any or all bids.

No bid shall be withdrawn for a period of thirty (30) days subsequent to the opening of the bids, without written consent of the Owner.

SAU Tech
Dr. Jerry Thomas, Chancellor
6415 Spellman Road
Camden, AR 71701

Lewis, Elliott, McMorran, Vaden,
Ragsdale & Woodward, Inc.
11225 Huron Lane, Suite 104
Little Rock, AR 72211
Telephone: (501) 223-9302

END OF NOTICE TO BIDDERS

INSTRUCTION TO BIDDERS

1. Securing Documents:

Copies of the proposed Contract documents are on file at the office of the Architect:

Lewis, Elliott, McMorran, Vaden,
Ragsdale & Woodward, Inc.
11225 Huron Lane, Suite 104
Little Rock, AR 72211

2. Definitions:

a. All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, are applicable to these Instructions to Bidders.

3. Examination of Drawings, Specifications, and Site of Work:

a. Before submitting a bid, each bidder shall carefully examine the Drawings, read the Specifications and all other proposed Contract Documents, and visit the site of the Work. Each Bidder shall fully inform himself prior to bidding as to all existing conditions and limitations under which the Work is to be performed, and he shall include in his bid a sum to cover all costs of all items necessary to perform the Work as set forth in the proposed Contract Documents. No allowance will be made to any bidder because of lack of such examination or knowledge. The submission of a bid will be construed as conclusive evidence that the bidder has made such examination.

b. Should the bidder find discrepancies in, or omissions from the drawings, or other bidding documents, or should he be in doubt as to their meaning, he should at once, notify the Architect, who will send a written addendum to all bidders. Neither the Owner nor the Architect will be responsible for any oral instructions. Any addenda issued during the time of bidding are to be covered in the proposal and in closing a contract, they will become a part thereof.

4. Substitutions:

a. Where a definite material is specified, it is not the intent to discriminate against any "approved equal" product of another manufacturer. It is the intent to set a definite standard.

b. Open competition is expected, but in all cases, complete data must be submitted for comparison and test when required by the Architect.

c. The materials, products and equipment described in the Bidding documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

d. No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. Information shall be submitted in a format that compares the proposed product in a direct comparison to the specified product; line number to line number in specifications. A statement setting forth changes in other materials, equipment or other portion of the Work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

e. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

f. No substitutions will be considered after the Contract award unless specifically provided in the Contract documents.

g. No substitution shall be made unless authorized in writing, by the Architect.

h. All bidders shall base their proposals on the material or specialty specified. Any proposal for substitution shall be submitted within 30 days after the award of the contract.

i. Should a substitution be accepted and should the substitute material prove defective or otherwise unsatisfactory for the service intended within the guaranty period, the Contractor shall replace this material or equipment with that which was originally specified, without cost to the Owner.

5. Bid Bond:

a. Proposals must be accompanied by a Bidder's Bond in an amount equal to 5% of Bid, executed by a surety company approved by the Owner, and authorized to do business in the State of Arkansas. The Bidder may furnish a cashiers check, in an amount equal to 5% of Bid, drawn on National Bank or a Bank having a membership in the Federal Reserve System and signed by the President or Cashier, in lieu of bond. The successful bidder's security will be retained until he has signed the Contract and furnished the required Labor and Materials Payment and Performance Bond. The Owner reserves the right to retain the security of the next lowest bidder until the lowest bidder enters into contract or until 60 days after bid opening, whichever is shorter. All other bid security will be returned as soon as practicable. If any bidder refuses to enter into a contract, the Owner will retain his bid security as liquidated damages but not as a penalty.

END OF SECTION

REQUIRED CONTRACT FORMS

The following are the construction document forms that, where required by the Architect, will be used during this project. These documents are either furnished in the project manual or available for inspection at the Architect's office:

Lewis, Elliott, McMorran, Vaden,
Ragsdale & Woodward, Inc.
11225 Huron Lane, Suite 104
Little Rock, AR 72211

Bid Form.	As furnished in Project Manual
*Form of Agreement Between Owner & Contractor	AIA Document A101
Contractors Qualification Statement	AIA Document A305
Bid Bond	AIA Document A310 or Cashier's Check
Performance Bond and Labor and Material Payment Bond	AIA Document A312
Insurance and Bonds	AIA Document A101 – 2017 Exhibit A
*Change Order.	AIA Document G701
Application and Certificate for Payment	AIA Document G702 and G703
*Certificate of Substantial Completion.	AIA Document G704
Certificate of Insurance	Acord Form (See sample furnished)
Contractor's Affidavit of Payment of Debts and Claims.	AIA Document G706
Lien Waiver Form (Builder's or Contractor's Affidavit)	As furnished in Project Manual
Consent of Surety - to Reduction or Partial Releases of Retainage	AIA Document G707A
Consent of Surety Company to Final Payment	AIA Document G707
*Architect's Supplemental Instructions.	AIA Document G710
Proposal Request.	AIA Document G709
Construction Change Directive	AIA Document G714
Project Team Directory.	AIA Document G808

*Indicates forms furnished and procedures initiated by the Architect.

END OF REQUIRED CONTRACT FORMS

SAMPLE OF LIABILITY
INSURANCE FORM

GENERAL:

The Contractor's insurance carrier shall supply the "Acord Certificate of Insurance" form exactly as shown on the sample form furnished in this Project Manual, and a notarized letter of endorsement "Specifically permitting the waiver of rights provision in Article 11.1.2.7 of the General Conditions of the Contract for Construction, AIA Document A201, as amended by the Supplementary Conditions and bound into this Project Manual".

END OF SECTION



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

12/11/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER ABC Insurance Agency Mailing Address City ST 11111		CONTACT NAME: Agency Contact Person PHONE (A/C, No, Ext): (111) 111-1111 FAX (A/C, No): (111) 111-1111 E-MAIL ADDRESS: agent@emailaddress.com	
INSURED ABC Construction Company Mailing Address City ST 11111		INSURER(S) AFFORDING COVERAGE INSURER A: Insurance Company INSURER B: Insurance Company INSURER C: Insurance Company INSURER D: Insurance Company INSURER E: Insurance Company INSURER F:	
		NAIC # 11111 11111 11111 11111 11111	

COVERAGES**CERTIFICATE NUMBER:** 2024 Sub Sample Cert**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC OTHER:	Y	Y	Policy Number	12/10/2024	12/10/2025	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000	
B	☒ AUTOMOBILE LIABILITY ☒ ANY AUTO OWNED AUTOS ONLY ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ONLY ☒ NON-OWNED AUTOS ONLY			Policy Number	12/10/2024	12/10/2025	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$	
C	☒ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE DED ☒ RETENTION \$ 10,000	Y	Y	Policy Number	12/10/2024	12/10/2025	EACH OCCURRENCE \$ 1,000,000 AGGREGATE \$ 1,000,000	
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N Y	N/A	Y	Policy Number	12/10/2024	12/10/2025	☒ PER STATUTE ☐ OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
E	Builders Risk Property Insurance			Policy Number	12/10/2024	12/10/2025		

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Project Name

CERTIFICATE HOLDER**CANCELLATION**

SAMPLE CERTIFICATE

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

AGENCY CUSTOMER ID: 00002879

LOC #: _____



ADDITIONAL REMARKS SCHEDULE

Page _____ of _____

AGENCY ABC Insurance Company		NAMED INSURED Lewis, Elliott, McMorran,Vaden, Ragsdale And Woodward Inc.
POLICY NUMBER		
CARRIER	NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 **FORM TITLE:** Certificate of Liability Insurance: Notes

Attach policy forms regarding Additional Insured, Blanket Waiver of Subrogation, Notice of Cancellation, Primary/Non-Contributory status, etc that are applicable to the policies listed on this certificate:

General Liability:

- *Owner & Architect shall be named as an Additional Insured or included in Blanket Additional Insured policy form
- *Per Project Aggregate Limit of Liability
- *Primary Non-contributory endorsement
- *Waiver of Subrogation in favor of Certificate Holder
- *30 Day Notice of Cancellation in favor of Certificate Holder

Workers Compensation:

- *Waiver of Subrogation in favor of Certificate Holder

Umbrella:

- *Confirmation of Following Form for Additional Insured & Waiver of Subrogation on underlying policies

LIEN WAIVER FORM

STATE OF ARKANSAS

COUNTY OF _____

_____ of _____
(Name) (Address)

being first duly sworn deposes and says:

That he is the sub-contractor and/or material supplier who worked on or furnished material to be used in the construction and improvements on the property located in _____, more particularly described as follows:

Affiant further states that all material used therein was of the quality prescribed in plans and specifications approved by the architects, Owner, or both, that all laws, ordinances, building codes and civic regulations concerning construction or repair of building(s) have been complied with and that the Owner has inspected said improvements and accepted same as being complete and satisfactory.

Affiant further states that all charges and costs for labor performed, material furnished, and fixtures installed on said premises have been fully paid; that said premises are free and clear of all lienable claims whatsoever arising under and by virtue of said construction, and warrants and guarantees to hold Owner, and those claiming under the Owner, including any mortgagee or title insurance company, free and immune from any liability therefore.

The release is given in order to induce payment in the amount of _____ and on receipt of this amount due, this release may be recorded, becomes valid, enforceable and of full effect.

Affiant further states that said construction began on the _____ day of _____ 2025 and was completed on or before the _____ day of _____ 2025, and he acknowledges receipt of all monies due him in connection therewith.

Sub-Contractor/Material Supplier

STATE OF ARKANSAS

COUNTY OF _____

Subscribed and sworn to before me this _____ day of _____, 2025.

Notary Public

My commission expires:

_____ Seal

GENERAL CONDITIONS

"THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", STANDARD FORM OF THE AMERICAN INSTITUTE OF ARCHITECTS, 2017 EDITION, A.I.A. DOCUMENT, A201, ARTICLES 1 THROUGH 15 INCLUSIVE, CONSISTING OF THIRTY NINE PRINTED PAGES, ARE HEREBY INCORPORATED AS A PART OF THE PROJECT MANUAL AND SHALL BE AS THOUGH THEY WERE ATTACHED HERETO. THE GENERAL CONDITIONS ARE ON FILE FOR PUBLIC INSPECTION AT THE OFFICE OF LEWIS, ELLIOTT, MCMORRAN, VADEN, RAGSDALE & WOODWARD, INC., 11225 HURON LANE, SUITE 104, LITTLE ROCK, ARKANSAS."

SUPPLEMENTARY
CONDITIONS

1. The "General Conditions of the Contract for Construction", AIA Document A201, 2017, Articles 1 through 15 inclusive, is a part of this Contract.
2. The following supplements shall modify, delete, and/or add to the General Conditions. Where any article, paragraph, or subparagraph in the General Conditions is supplemented by one of the following paragraphs, the provisions of such article, paragraph, or subparagraph shall remain in effect and the supplemental provisions shall be considered an added thereto. Where any article, paragraph, or subparagraph in the General Conditions is amended, voided, or superseded by any of the following paragraphs, the provisions of such article, paragraph, or subparagraph not so amended, voided, or superseded shall remain in effect.
3. Add subparagraph 1.1.9:

"The word "Provide" shall mean to furnish and install, complete in place, operating, tested and approved".
4. Add subparagraph 1.1.10:

"The word "Product(s)" refers to the materials, systems, and equipment provided by the Contractor".
5. In subparagraph 3.4.3, add: "Any person whose work is unsatisfactory to the Owner or the Architect shall be removed from the work upon receipt of written notice from the Architect".
6. Add subparagraph 3.4.4:

"All Contractors and Subcontractors engaged in the Work shall conform to the labor laws of the State of Arkansas, and the various acts amendatory and supplementary thereto, and to all other laws, ordinances, and legal requirements applicable there to".
7. Add subparagraph 3.7.6:

"The Contractor shall be licensed contractor as provided by the Act Number 124 of the 1939 Act Number 217 of 1945 and Act Number 153 of 1951 and Act Number 150 of 1965 as enacted by the General Assembly of the State of Arkansas".
8. Delete subparagraphs 3.9.2 and 3.9.3 in their entirety and substitute the following subparagraph 3.9.2:

"The superintendent and assistants shall be satisfactory to the Architect, and shall not be changed except with the consent of the Architect, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ".
9. Add subparagraph 3.13.1:

3.13.1 "All material shall be arranged and maintained in an orderly manner without hindering the use of walks, drives, roads, and entrances. Should it be necessary at any time to move material, sheds, or storage platforms, the Contractor shall do so as and when directed, and at his own expense".

10. Add subparagraphs 7.2.2 and 7.2.3:

7.2.2 The contractor shall be required to furnish the original bills and payrolls and support the statement with proper affidavits. The burden of proof of the costs rests upon the Contractor. Bills for extras will be allowed only when work is ordered in writing. No bills based on verbal orders will be allowed by the Architect unless accompanied by a written order from the Architect. The Contractor waives all claim for extension of time of completion on account of extra work, unless application for such extension is made by the Contractor in writing within twenty (21) days of the time such work is ordered.

7.2.3 The Contractor shall not make any changes except on written order of the Owner. Contractor's request for a Change Order to the Work shall be made on the AIA Document G709 and shall provide itemized breakdown of whole sum listing unit quantities and costs of all labor and materials. Contractor shall submit all verifying data as required to support claims, such as copies or original invoices, payrolls, etc. Requests shall identify percentage sums included for insurance, taxes, bonds, overhead and profit. Percentages shall not be allowed for changes altering allowances. Changes in the work by cost and a mutual acceptable fixed or percentage fee shall be computed as follows:

- a. Net cost of materials, plus State Sales Tax.
- b. Net delivery cost.
- c. Net placing cost plus W.C. Insurance premium and FICA Tax.
- d. 12% Overhead and Profit Charge on a. through c. allowed.
- e. Allowable Bond Premium.

Where changes in the work involve subcontract work, the General Contractor shall add to cost of subcontract work a profit charge of 5% total overhead and profit charge.

11. Delete subparagraph 7.4 and substitute the following:

"The Architect will have authority to order minor changes in the Work in the form of Field Orders which interpret the Contract Documents or order minor changes in the work without change in Contract Sum or Contract Time. Such changes shall be effected by written Field Order, and shall be binding on the Owner and the Contractor. The Contractor shall attend to such Field Order promptly".

12. Add subparagraphs 7.4.1 and 7.4.2:

7.4.1 "If the Contractor considers that a change in Contract Sum or Contract Time is required, he shall submit an itemized proposal to the Architect immediately and before proceeding with this work. If the proposal is found to be satisfactory and in proper order, the Field Order will in that event be superseded by a Change Order as provided in Paragraph 7.2. The Contractor shall attend to such Field Orders promptly".

7.4.2 "When the time required for processing a Change Order would cause a delay in the progress of the Work, the Architect may issue a Field Order which, when signed by the Owner and the Contractor, will authorize the Contractor to proceed with changes in the work, which may change the Contract Sum and/or the Contract Time. Such Field Orders will be subsequently incorporated in the work as Change Orders as provided in paragraph 7.2. The contractor shall attend to such Field Order promptly".

13. Delete subparagraph 9.3.1 and substitute the following:

"On or before the twenty-fifth day of each calendar month, the Contractor shall submit to the Architect an itemized Application for Payment on AIA Document G702, supported by data substantiating the Contractor's right to payment submitted on AIA Document G703 and attached thereto. The Contractor shall submit one (1) legible copy of these prepared Application for Payment forms and (1) legible copy of each invoice or statement supporting requests for payment of materials or equipment stored on job site or in an approved bonded warehouse". These forms can be emailed to the address as provided at the Pre-Construction meeting or by mailing, shipping or hand-delivery.

"Throughout entire job, the Owner will pay 95 percent of the amount due the Contractor on account of progress payments in compliance with Act 193 of 2009 amended AR. Code. Ann. §22-9-604(a). No retainage will be withheld on material and/or equipment stored on job site or in an approved bonded warehouse".

14. 10.2.2 Add the following new subparagraphs:

10.2.2.1 Project with trenching or excavation which exceeds five feet in depth shall comply with Arkansas Code Annotated §22-9-212.

10.2.2.2 The current edition of OSHA Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P, shall be incorporated by reference in this contract.

15. NOTE: Refer to Sample of Liability Insurance Form for Sample Acord Form. Add the following clauses to 11.1.1:

11.1.1.1 The Contractor shall purchase and maintain Workers Compensation insurance providing Statutory Workers compensation benefits as well as Employers Liability Coverage of at least \$1,000,000.00 Limit of Liability.

The following endorsements providing extensions of coverage shall be attached forming a part of said Workers compensation policy:

- a. Broad Form All States Endorsement
- b. Maritime or Jones Act coverage - where applicable, such as work on navigable waters.
- c. United States Longshoremen's & Harbor Workers Coverage (may be voluntary if job is not close to body of water).

11.1.1.2 Comprehensive General Liability insurance shall be purchased and maintained by the contractor providing the following coverages and limits of liability:

- a. Premises & Operations
- b. Independent Contractors
- c. Completed Operations and Products
- d. X-Explosion, C-Collapse, U-Underground Property Damage Coverage – When Applicable Included
- e. Contractual Liability/Blanket Coverage
- f. Personal Injury Coverage with Employee Exclusion Removed
- g. Owner and Architect shall be named as an Additional Insured on CGL Policy including Completed Operations
- h. Additional insured shall be provided with a certificate of insurance

Limits No Less Than:

\$1,000,000 Per Occurrence

\$2,000,000 Annual Aggregate

\$2,000,000 Products/Completed Operations Aggregate

“Per Project Aggregate” endorsement shall be included.

11.1.1.3 Business Auto Liability or Comprehensive Auto Liability policy shall be purchased and maintained by the contractor providing coverage for all owned, non-owned and hired autos.

Limit of Liability required shall be:

\$1,000,000.00 Combined Single Limit.

11.1.1.4 An Umbrella Liability Policy shall be purchased and maintained by the contractor providing coverage over and above required underlying Employers Liability, Comprehensive General Liability, and Business Auto Liability coverages.

Limits of Liability shall be no less than \$1,000,000.00 per Occurrence/\$1,000,000.00 Aggregate.

The Owner and Architect shall be named as an Additional Insured.

11.1.1.5 Property Insurance, (Builder's Risk, Installation Floater, Boiler & Machinery coverage when applicable), providing All-Risk Coverage shall be purchased and maintained by the contractor providing full coverage for all materials, including labor, destined to be part of job and/or already part of job.

The Owner, Architect, Contractor and all Subcontractors shall be included as Named Insureds covering their interest of the said job.

The policy shall reflect a Deductible of \$250.00 per occurrence which shall be paid in all cases by the Contractor.

11.1.1.6 Miscellaneous Requirements:

- a. All required insurance coverages and bonds shall be provided by an insurance company of a sound financial rating and licensed to do business in the state of the designated job.
- b. Certificates of Insurance shall be filed in duplicate with the Architect and approved by the Owner prior to commencement of the work. The certificates shall reflect coverages, limits of liability, and wording at least as broad as the attached specimen. Use the Accord Certificate of Insurance form as shown by specimen included in this set of specifications. All certificates shall include 30 day written notice of cancellation applicable to the General Liability, Workers Compensation, Automobile and Umbrella policies.

- c. The contractor shall not commence work under this contract or allow any subcontractor or anyone directly or indirectly employed by anyone of them to commence work until he has obtained all insurance required under this, and two duly executed Certificates of such insurance shall have been filed with the Architect and approved by the Owner and Contractor has complied with bonding requirements and work order has been issued. Each such certificate and policy shall contain a provision that coverages afforded under the policies will not be cancelled or materially altered until at least thirty days prior written notice has been given to the Owner.
 - d. The insurance carrier shall issue an endorsement specifically permitting the waiver of rights provision in AIA Document A201, Article 11.3.1.
16. Add subparagraph 11.1.1.7:
- If by the terms of this insurance any mandatory deductibles are required, or if the Contractor should elect, with the concurrence of the Owner, to increase the mandatory deductible amounts or purchase this insurance with voluntary deductible amounts, the Contractor shall be responsible for payment of the amount of the deductible in the event of a paid claim.
17. Add subparagraph 11.1.2.1:
- "Contractor shall furnish and pay for an Executed Performance Bond on AIA Document A311 and Labor and Material Payment bond on AIA Document A311 in the amount of 100% of the contract sum. No modification to the standard bond forms will be allowed without written consent of the Architect".
18. Add subparagraph 11.1.2.2:
- "After being approved by the Architect and prior to any work under this contract, the Contractor shall file the bonds with the circuit clerk and recorder of the county in which the work to be performed is located. Contractor shall obtain from the circuit clerk certificates as evidence that the bonds have been approved and filed with the clerk and said certificates shall be filed with the Architect".
19. Add subparagraph 11.1.5:
- "If at any time a surety on any such bond is declared bankrupt or loses its right to do business in this state, Contractor shall notify the Owner immediately and within ten (10) days, furnish an acceptable bond (or bonds), in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable Bond to the Owner. Failure to comply with the above requirements may be deemed sufficient grounds for termination of this contract".
20. Delete subparagraph 11.2.1 in its entirety and substitute the following:
- The Contractor shall be responsible for purchasing and maintaining liability insurance as will protect the Owner against claims which may arise from operations under the contract.

21. Delete subparagraph 11.2.2 in its entirety and substitute the following:

11.2.2 The Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. Such insurance shall be in a company or companies against which the Owner has no reasonable objection. This insurance shall include the interests of the Owner, the Contractor, Subcontractors, and Subcontractors in the Work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief. If not covered under all risk insurance or otherwise provided in the Contract Documents, the contractor shall effect and maintain similar property insurance on portions of the work stored off the site or in transit when such portions of the work are to be included in an application for Payment under subparagraph 9.3.2. The form of policy for this coverage shall be completed value.

22. Add subparagraph 11.5.3

The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section 11.1.1.5 Property Insurance have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

23. Delete subparagraph 15.1.6.2 in its entirety and substitute the following:

"Extension of Time Due to Weather Delays: Claims for extension of time due to unusual inclement weather shall be granted only because such unusual inclement weather prevented the execution of major items of the work. Unusual inclement weather is defined as severe weather which is beyond the normal weather recorded and expected for the month of the year as shown in the chart below. Extension of time due to weather delays shall be granted only for those days in excess of the number of days shown. Extension of time requests shall be submitted in writing within 30 days of occurrence and submitted with current pay request.

PRECIPITATION

<u>MONTH</u>	<u>AVERAGE NO. OF DAYS .01" OR MORE</u>
January	10
February	9
March	10
April	10
May	10
June	8
July	9
August	7
September	7
October	6
November	8
December	9

24. In paragraph 15.3, omit any and all references to arbitration.
25. Delete paragraph 15.4 in its entirety.

END OF SUPPLEMENTARY CONDITIONS

52.222-5 Davis-Bacon Act—Secondary Site of the Work.

As prescribed in [22.407](#)(h), insert the following provision:

DAVIS-BACON ACT—SECONDARY SITE OF THE WORK (JULY 2005)

(a)(1) The offeror shall notify the Government if the offeror intends to perform work at any secondary site of the work, as defined in paragraph (a)(1)(ii) of the FAR clause at [52.222-6](#), Davis-Bacon Act, of this solicitation.

(2) If the offeror is unsure if a planned work site satisfies the criteria for a secondary site of the work, the offeror shall request a determination from the Contracting Officer.

(b)(1) If the wage determination provided by the Government for work at the primary site of the work is not applicable to the secondary site of the work, the offeror shall request a wage determination from the Contracting Officer.

(2) The due date for receipt of offers will not be extended as a result of an offeror's request for a wage determination for a secondary site of the work.

(End of provision)

52.222-6 Davis-Bacon Act.

As prescribed in [22.407](#)(a), insert the following clause:

DAVIS-BACON ACT (JULY 2005)

(a) Definition.—“Site of the work”—

(1) Means—

(i) *The primary site of the work.* The physical place or places where the construction called for in the contract will remain when work on it is completed; and

(ii) *The secondary site of the work, if any.* Any other site where a significant portion of the building or work is constructed, provided that such site is—

(A) Located in the United States; and

(B) Established specifically for the performance of the contract or project;

(2) Except as provided in paragraph (3) of this definition, includes any fabrication plants, mobile factories, batch plants, borrow pits, job headquarters, tool yards, etc., provided—

(i) They are dedicated exclusively, or nearly so, to performance of the contract or project; and

(ii) They are adjacent or virtually adjacent to the “primary site of the work” as defined in paragraph (a)(1)(i), or the “secondary site of the work” as defined in paragraph (a)(1)(ii) of this definition;

(3) Does not include permanent home offices, branch plant establishments, fabrication plants, or tool yards of a Contractor or subcontractor whose locations and continuance in operation are determined wholly without regard to a particular Federal contract or project. In addition, fabrication plants, batch plants, borrow pits, job headquarters, yards, etc., of a commercial or material supplier which are established by a supplier of materials for the project before opening of bids and not on the Project site, are not included in the “site of the work.” Such permanent, previously established facilities are not a part of the “site of the work” even if the operations for a period of time may be dedicated exclusively or nearly so, to the performance of a contract.

(b)(1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, or as may be incorporated for a secondary site of the work, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Any wage determination incorporated for a secondary site of the work shall be effective from the first day on which work under the contract was performed at that site and shall be incorporated without any adjustment in contract price or estimated cost. Laborers employed by the construction Contractor or construction subcontractor that are transporting portions of the building or work between the secondary site of the work and the primary site of the work shall be paid in accordance with the wage determination applicable to the primary site of the work.

(2) Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (e) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period.

(3) Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

(4) The wage determination (including any additional classifications and wage rates conformed under paragraph (c) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the primary site of the work and the secondary site of the work, if any, in a prominent and accessible place where it can be easily seen by the workers.

(c)(1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

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

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the:

The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to paragraphs (c)(2) and (c)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

(e) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(End of clause)

52.222-7 Withholding of Funds.

As prescribed in [22.407\(a\)](#), insert the following clause:

WITHHOLDING OF FUNDS (FEB 1988)

The Contracting Officer shall, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other federally assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(End of clause)

52.222-8 Payrolls and Basic Records.

As prescribed in [22.407\(a\)](#), insert the following clause:

PAYROLLS AND BASIC RECORDS (FEB 1988)

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the clause entitled Davis-Bacon Act, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)(1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause. This information may be submitted in any form desired. Optional [Form WH-347](#) (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the—

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors.

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

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause and that such information is correct and complete;

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

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

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional [Form WH-347](#) shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (b)(2) of this clause.

(4) The falsification of any of the certifications in this clause may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(End of clause)

52.222-9 Apprentices and Trainees.

As prescribed in [22.407\(a\)](#), insert the following clause:

APPRENTICES AND TRAINEES (JULY 2005)

(a) Apprentices.

(1) An apprentice will be permitted to work at less than the predetermined rate for the work performed when employed—

(i) Pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer, and Labor Services (OATELS) or with a State Apprenticeship Agency recognized by the OATELS; or

(ii) In the first 90 days of probationary employment as an apprentice in such an apprenticeship program, even though not individually registered in the program, if certified by the OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program.

(3) Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph (a)(1) of this clause, shall be paid not less than the applicable wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination.

(5) Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(6) In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees.

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer, and Labor Services (OATELS). The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by OATELS.

(2) Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the OATELS shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed.

(3) In the event OATELS withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

(End of clause)

52.222-10 Compliance with Copeland Act Requirements.

As prescribed in [22.407](#)(a), insert the following clause:

COMPLIANCE WITH COPELAND ACT REQUIREMENTS (FEB 1988)

The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

(End of clause)

52.222-11 Subcontracts (Labor Standards).

As prescribed in [22.407\(a\)](#), insert the following clause:

SUBCONTRACTS (LABOR STANDARDS) (JULY 2005)

(a) *Definition.* “Construction, alteration or repair,” as used in this clause, means all types of work done by laborers and mechanics employed by the construction Contractor or construction subcontractor on a particular building or work at the site thereof, including without limitation—

(1) Altering, remodeling, installation (if appropriate) on the site of the work of items fabricated off-site;

(2) Painting and decorating;

(3) Manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work;

(4) Transportation of materials and supplies between the site of the work within the meaning of paragraphs (a)(1)(i) and (ii) of the “site of the work” as defined in the FAR clause at [52.222-6](#), Davis-Bacon Act of this contract, and a facility which is dedicated to the construction of the building or work and is deemed part of the site of the work within the meaning of paragraph (2) of the “site of work” definition; and

(5) Transportation of portions of the building or work between a secondary site where a significant portion of the building or work is constructed, which is part of the “site of the work” definition in paragraph (a)(1)(ii) of the FAR clause at [52.222-6](#), Davis-Bacon Act, and the physical place or places where the building or work will remain (paragraph (a)(1)(i) of the FAR clause at [52.222-6](#), in the “site of the work” definition).

(b) The Contractor shall insert in any subcontracts for construction, alterations and repairs within the United States the clauses entitled—

(1) Davis-Bacon Act;

(2) Contract Work Hours and Safety Standards Act—Overtime Compensation (if the clause is included in this contract);

(3) Apprentices and Trainees;

(4) Payrolls and Basic Records;

(5) Compliance with Copeland Act Requirements;

(6) Withholding of Funds;

(7) Subcontracts (Labor Standards);

(8) Contract Termination—Debarment;

(9) Disputes Concerning Labor Standards;

(10) Compliance with Davis-Bacon and Related Act Regulations; and

(11) Certification of Eligibility.

(c) The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor performing construction within the United States with all the contract clauses cited in paragraph (b).

(d)(1) Within 14 days after award of the contract, the Contractor shall deliver to the Contracting Officer a completed [Standard Form \(SF\) 1413](#), Statement and Acknowledgment, for each subcontract for construction within the United States, including the subcontractor’s signed and dated acknowledgment that the clauses set forth in paragraph (b) of this clause have been included in the subcontract.

(2) Within 14 days after the award of any subsequently awarded subcontract the Contractor shall deliver to the Contracting Officer an updated completed [SF 1413](#) for such additional subcontract.

(e) The Contractor shall insert the substance of this clause, including this paragraph (e) in all subcontracts for construction within the United States.

(End of clause)

52.222-12 Contract Termination—Debarment.

As prescribed in [22.407](#)(a), insert the following clause:

CONTRACT TERMINATION—DEBARMENT (FEB 1988)

A breach of the contract clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act—Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Subcontracts (Labor Standards), Compliance with Davis-Bacon and Related Act Regulations, or Certification of Eligibility may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 CFR 5.12.

(End of clause)

52.222-13 Compliance with Davis-Bacon and Related Act Regulations.

As prescribed in [22.407](#)(a), insert the following clause:

COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS (FEB 1988)

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are hereby incorporated by reference in this contract.

(End of clause)

52.222-14 Disputes Concerning Labor Standards.

As prescribed in [22.407](#)(a), insert the following clause:

DISPUTES CONCERNING LABOR STANDARDS (FEB 1988)

The United States Department of Labor has set forth in 29 CFR parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(End of clause)

52.222-15 Certification of Eligibility.

As prescribed in [22.407](#)(a), insert the following clause:

CERTIFICATION OF ELIGIBILITY (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

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

(End of clause)

"General Decision Number: AR20250020 07/11/2025

Superseded General Decision Number: AR20240020

State: Arkansas

Construction Type: Building
BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Counties: Calhoun, Clark, Columbia, Dallas, Hempstead, Howard, Lafayette, Montgomery, Ouachita, Pike and Sevier Counties in Arkansas.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/03/2025
1	07/11/2025

* CARP0216-003 07/01/2024

	Rates	Fringes
MILLWRIGHT.....	\$ 34.02	11.88

ENGI0624-006 01/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Crane.....	\$ 34.25	15.00
Forklift.....	\$ 33.25	15.00

IRON0321-010 08/01/2024

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 28.00	21.21

* PAIN0424-008 07/01/2021

	Rates	Fringes
PAINTER (Spray).....	\$ 16.25 **	10.42

* SUAR2015-017 01/09/2017

	Rates	Fringes
BRICKLAYER.....	\$ 19.18	1.60
CARPENTER, Excludes Drywall		
Hanging.....	\$ 16.03 **	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 19.14	0.00
DRYWALL HANGER.....	\$ 16.19 **	0.00
ELECTRICIAN.....	\$ 21.21	5.74
LABORER: Common or General.....	\$ 12.84 **	0.00
LABORER: Mason Tender - Brick...	\$ 12.88 **	0.00
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 23.95	0.00
OPERATOR: Bulldozer.....	\$ 18.13	0.00
PAINTER (Brush and Roller).....	\$ 17.02 **	6.42
PLUMBER.....	\$ 24.42	4.86
SHEET METAL WORKER (HVAC Duct		
Installation Only).....	\$ 20.06	6.75
TRUCK DRIVER: Dump Truck.....	\$ 15.00 **	0.00

WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.75) or 13658 (\$13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

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

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes

over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE:

UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

a) a survey underlying a wage determination

- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

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

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

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

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

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

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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

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

=====
END OF GENERAL DECISION"

SUMMARY OF WORK

PART ONE - GENERAL

1.1 WORK COVERED BY THE CONTRACT DOCUMENTS

A. The work generally consists of:

1. Interior renovation of existing building to include demolition of existing walls, construction of new offices, lab space, ADA compliant bathrooms, window replacement, exterior door replacement, and addition of new exterior entry. Work shall include finishes, plumbing, HVAC and electrical where shown on the drawings.

1.2 LAYOUT OF NEW WORK

- A. The General Contractor shall be responsible for correct layout of all proposed improvements in accordance with the Drawings. He shall establish building lines, grades and elevations called for on the Drawings.

1.3 CONTINGENCY ALLOWANCE

- A. The Contractor shall include in the bid a contingency amount of \$25,000. This contingency shall be used only upon written approval from the Architect. Any difference in cost above or below this amount shall be adjusted by change order. Overhead and profit shall not be allowed if use of the contingency is necessary.

PART TWO – PRODUCTS

Not Used

PART THREE – EXECUTION

Not Used

END OF SECTION

ALLOWANCES

PART ONE - GENERAL

1.1 THE CONTRACTOR SHALL PROVIDE THE FOLLOWING ALLOWANCES IN THE BASE BID:

- A. Plumbing Allowance: The Contractor shall include in the bid a contingency amount of \$10,000. This contingency shall be used only upon written approval from the Architect. Any difference in cost above or below this amount shall be adjusted by change order. Overhead and profit shall not be allowed if use of the contingency is necessary.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

UNIT PRICING

PART ONE – GENERAL

1.1 THE CONTRACTOR SHALL PROVIDE THE FOLLOWING UNIT PRICE WITH THE BASE BID:

- A. SITE UNDERCUT: Remove unsuitable soil and replace with compacted select fill as directed by the Architect's Representative.

Base Bid to include an allowance of 10 cubic yards undercut and backfill soils at _____/per cubic yard. Undercut shall be paid at the unit price quoted. Measurement for payment will be based on cross sectional measure established by soil removed below a stripping depth of 8 inches in fill areas and below planned subgrade in cut areas. Payment shall be made at the unit price for quantities less than or greater than the allowance quantity given herein.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

ALTERNATES

PART ONE – GENERAL

1.1 THE CONTRACTOR SHALL PROVIDE THE FOLLOWING ALTERNATES TO THE BASE BID:

- A. Deductive Alternate No. 1: State the amount to be deducted from the Base Bid to omit in Career Academy Welding Lab Room 113 the epoxy flooring and painting of existing structure, brick walls, walls, columns, and welding stations.
- B. Deductive Alternate No. 2: State the amount to be deducted from the Base Bid to omit painting exterior of building, complete.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

PROJECT MEETINGS

PART ONE - GENERAL

1.1 PRECONSTRUCTION CONFERENCE

- A. Before the work order has been issued on the project by the Architect, a preconstruction conference shall be held on the job site with the following personnel; Architect's representative, General Contractor, Superintendent (who will be on the job at all times), mechanical contractor, plumbing and electrical contractor and, if he so desires, the Owner. This meeting is designed for a two-fold purpose: To clarify any questions about the plans and specifications and the transfer of ideas as to what the Architect will expect for all trades and subcontractors.
- B. The purpose being as follows: Distribution by Prime Contractor of following:
 - 1. List of subcontractors, including addresses, telephone numbers and person to contact (to be used also as a Job Directory).
 - 2. Tentative Progress Schedule prepared in accordance with the following provisions:
 - a. Schedule and regulate all construction activities. The schedule shall indicate start and finish dates for activities, submittal and delivery dates for major materials and equipment, and final completion date.
 - b. Prepare tentative Progress Schedule for preview at initial progress meeting, final schedule being prepared shortly thereafter.
 - c. Discussion of following:
 - 1) General over-all progress based on tentative Progress Schedule as presented by Prime Contractor.
 - 2) Shop Drawing submission procedure as presented by Architect-Engineer.
 - 3) Change Order processing procedure as presented by Architect-Engineer.
 - 4) Pay request submission procedure as presented by Architect-Engineer.
 - 5) Clarification of Architect-Engineer and Contractor personnel, duties, functions and responsibilities.
 - d. A pre-work conference shall be required between the Architect's representative, job superintendent and major trades subcontractor before their phase of work begins.

1.2 PROGRESS MEETINGS

- A. General Contractor, major subs and all trades on job at the time shall attend bi-monthly (twice a month) progress meetings upon request of the Architect.
- B. Architect reserves the right to initiate additional meetings between above parties as he deems necessary.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

SHOP DRAWINGS, PRODUCT
DATA & SAMPLES

PART ONE - GENERAL

1.1.1 Work included:

1.1.1.1 Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and government standards, or description of required attributes and performance.

1.1.1.2 To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for their review by the Architect. All required submittals, shop drawings, product data, and samples shall be submitted within four (4) weeks after construction contracts have been signed.

1.1.1.3 Make all submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.

1.1.1.4 Material Safety Data Sheets (MSDS) shall not be submitted as part of the submittal package. They are not a requirement of the Contract Documents.

1.1.2 Related work described elsewhere: Individual requirements for submittals are described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

1.2.1 Coordination of submittals: Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item and the submittal for it conforms in all respects with the requirements of the Contract Documents. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed. Any Shop Drawing submitted to the Architect that has not been checked thoroughly, stamped and signed by the Contractor will be rejected.

1.2.2 Progress schedule: Designate in the Progress Schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Product Data, and Samples will be needed.

1.3 SHOP DRAWINGS – ELECTRONIC SUBMITTAL PROCEDURES

1.3.1 Summary:

1. Shop drawings and product data submittals shall be transmitted to Architect in electronic (PDF) format via Architect's SharePoint Portal (sp.laeprojects.com).
2. The use of Procore for transmitting shop drawings and product data submittals shall be allowed as long as LAE is given administration privileges to modify work flow.
3. Details shall be identified by reference to sheet and detail, schedules, or room numbers shown on the Contract Drawings.
4. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.

5. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
6. Shop Drawings shall be present in a clear and thorough manner.

1.3.2 Requirements:

1. All participants in electronic documentation process will be required to have internet access.
2. Necessary software Adobe Acrobat (www.adobe.com) or Blubeam PDF Revu (www.blubeam.com) to produce, view, apply comments and save to PDF files. A PDF reader only will not be adequate.

1.4 PRODUCT DATA

1.4.1 Preparation:

1. Provide cover page with project name and contractor name(s).
2. Include "Table of Contents" if multiple items are included in submittal.
3. Clearly mark each copy to identify pertinent products or models.
4. Show performance characteristics and capacities.
5. Show dimensions and clearances required.
6. Show wiring or piping diagrams and controls.
7. Include special installation instructions.

1.4.2 Manufacturer's standard schematic drawings and diagrams:

1. Modify drawings and diagrams to delete information which is not applicable to the Work.
2. Supplement standard information to provide information specifically applicable to the Work.

1.4.3 Submission:

1. Contractor shall request access to Architect's SharePoint Portal (sp.laeprojects.com).
2. Submittal Preparation - Contractor may use any or all of the following options:
 - a. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor through means provided by and required by Contractor.
 - b. Subcontractors and Suppliers provide paper submittals to General Contractor who electronically scans and converts to PDF format.
3. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
4. Contractor shall transmit each submittal to Architect using the Architect's SharePoint Portal (sp.laeprojects.com) or Procore (with administration privileges to modify work flow).
5. At discretion of Architect's Reviewer, paper copies can be requested upon receipt of electronic submittal in order to assist in review. Request will be made through email. Contractor will provide the number of paper copies requested.
6. Architect / Engineer review comments will be made available on the Architect's SharePoint Portal for downloading. Contractor will receive email notice of completed review.
7. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.

1.5 SAMPLES

1.5.1 Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture and pattern.
3. Workmanship when applicable.

1.5.2 Field samples and mock-up:

1. Erect at the project site at a location acceptable to the Architect.
2. Size or area: That specified in the respective specification section.
3. Fabricate each sample and mock-up complete and finished.
4. Remove mock-ups at conclusion of the Work or when acceptable to the Architect.

1.6 NOTIFICATION

1.6.1 Notify the Architect in writing, at the time of submission, of any deviations in the submittals from requirements of the Contract Documents.

1.6.2 Notify the Architect in writing, at the time of resubmission, of changes made on re-submittals other than those previously requested by the Architect.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

TEMPORARY FACILITIES
AND CONTROLS

PART ONE – GENERAL

1.1 DESCRIPTION

- A. Work included: Temporary facilities and controls required for this Work include, but are not necessarily limited to:
 - 1. Field Offices and sheds.
 - 2. Sanitary facilities.
 - 3. Enclosures such as tarpaulins, barricades, and canopies.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and local codes and regulations.

1.3 TEMPORARY SANITARY FACILITIES

- A. Provide temporary sanitary facilities in the quantity required, for use of all personnel. Maintain in a sanitary condition at all times.
- B. Service, clean, and maintain facilities and enclosures.

1.4 REMOVAL

- A. Completely remove temporary facilities and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.

1.5 FIELD OFFICES AND SHEDS

- A. Provide a field office building and sheds adequate in size and accommodation for all Contractor's offices, supply and storage.
- B. The entire facility, including furniture, will remain the property of the Contractor and shall be removed from the site after completion of the Work.

1.6 ENCLOSURES

- A. Furnish, install, and maintain for the duration of construction all required scaffolds, tarpaulin, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the work in compliance with all safety and other regulations.

1.7 PROJECT SIGNS

- A. Provide 4' x 8' x 3/4" exterior grade plywood on two 8' x 4' x 4' treated wood posts. Paint sign as directed by Architect.
- B. Allow no signs or advertising of any kind on the job site except as specifically approved in advance by the Architect.

PART TWO – PRODUCTS

Not Used.

PART THREE - EXECUTION

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

END OF SECTION

PART ONE - GENERAL

1.1 WORK INCLUDED

- A. Execute cleaning during progress of the Work and at completion of the Work.

PART TWO - PRODUCTS

2.1 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

PART THREE - EXECUTION

3.1 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.2 FINAL CLEANING

- A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
- B. Wash and shine glazing and mirrors.
- C. Polish glossy surfaces to a clear shine.
- D. Ventilating systems:
 - 1. Clean permanent filters and replace disposable filters if units are operated during construction.
 - 2. Clean ducts, blowers and coils if units were operated without filters during construction.
- E. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds disturbed during construction.

END OF SECTION

CONTRACT CLOSEOUT

PART ONE - GENERAL

1.1 PRODUCT CLOSEOUT

- A. Upon completion of the project, the Contractor shall remove all temporary structures and facilities from the site, and leave the premises in the condition required by the Construction Documents. The Contractor shall notify the Architect, in writing, as to the date when, in his opinion all or a designated portion of the work will be substantially completed and ready for final observation and the punch list to be performed on the building. If the Architect determines that the state of preparedness is as represented, the punch list will promptly be started on the building.
- B. The Architect will give written copies of the Punch List to the Contractor of observed defects. The Contractor shall promptly remedy any defects due to noncompliance of Construction Documents, faulty materials, or workmanship and pay for any damage to other work resulting therefrom.

1.2 FINAL OBSERVATION

- A. When defects are remedied as acceptable and upon receipt of punch list with each item initialed and dated acknowledging same, Architect shall arrange for final observation with the Owner, General Contractor and the Architect. Should Architect/Engineer perform additional observations due to failure of work not complying with the claims of status of completion made by the Contractor, the Architect/Engineer will be compensated for such additional observations by the Contractor. The amount of compensation due to the Architect/Engineer shall be deducted from the final payment to the Contractor.
- B. Immediately prior to final observation and acceptance, remove protective covers or markings and complete surface treatments, washing or polishing as specified, leaving all interior surfaces, including projections, in such condition that all areas can be occupied and used without further cleaning. (This includes all heat and air conditioning grilles, etc. provided under the Mechanical Work and all electrical fixtures and switch plates, etc., provided under the Electrical Work.)

1.3 PAPER WORK

- A. Final payment of the retainage will be withheld until the following documents are delivered to the Architect on a USB flash drive or by link or other electronic method of transferring the files. Files to be organized and clearly labeled. Large files containing multiple documents are to include an index and page numbers indicating location of various sections or documents.

1. Submittals / Shop Drawings:
An approved copy of each submittal, manufacturer's brochures, test data, etc., submitted to the Architect for approval during the course of construction shall be included. File names to be 60 characters or less. Longer file names will not be accepted due to issues caused with transferring and opening files.
2. Operation & Maintenance Manuals:
Include scanned copies of all operation and instruction manuals (not submittals, shop drawings, etc.) for all material, equipment or assemblies furnished or installed as part of this contract. Each manual to be in its own file and clearly labeled.
3. Record Documents / As-Built Drawings:
Provide, as described in Section 01 78 39, a scanned copy of the project record documents, with all dimensions of utility locations, variances from original drawings, etc., clearly documented in red. Each plan sheet to be included, regardless of whether changes were made to that work or not. .
4. Project Directory: Complete listing of all subcontractors, mechanics, and material suppliers involved in the work under this contract.
5. Warranties: Submit signed and notarized copies of all manufacturers, mechanics, contractors or supplier warranties required by the contract documents, including General Contractor's one (1) year warranty. Form and wording of guarantees must be as specified and/or as submitted by the Contractor and approved by the Architect prior to bidding.
6. Lien Waivers: Submit signed and *notarized* lien waivers from all subcontractors, mechanics, and material suppliers involved in the work of this contract. *No partial lien waivers shall be accepted.* Lien Waiver form to be as supplied by the Architect.
7. AIA Forms:
 - 1) AIA Document G706 - Contractor's Affidavit of Payment of Debts And Claims *General Contractor to generate & complete*
 - 2) AIA Document G706A - Contractor's Affidavit of Release of Liens *General Contractor to generate & complete*
 - 3) AIA Document G707 - Consent of Surety Company to Final Payment *General Contractor to generate & complete*
 - 4) AIA Document G704* – Certificate of Substantial Completion
**Architect to generate (Signed by Owner, Architect, and Contractor)*

AIA Forms can be obtained on-line at
<https://shop.aiacontracts.com>

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

PROJECT RECORD
DOCUMENTS

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Reference: Applicable provisions of the General and Supplementary Conditions and Division 1, General Requirements, govern all work of this Section.

1.2 WORK

- A. Maintain at the site for the Owner one record copy of:
 - 1. Drawings, Specifications, Addenda, Change Orders, and other modifications to the Contract.
 - 2. Approved Shop Drawings, and Product Data.
 - 3. Field Test Records.
- B. Record actual construction on drawings at the job site. Provide the job site set of drawings with close-out documents as required and one (1) photo copied set to the Architect.

1.3 RELATED REQUIREMENTS

- A. Submittals - Section 01 33 23
- B. Conditions of the Contract

1.4 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain documents in a secure, clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- B. Make documents available at all times for inspection by Architect.

1.5 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters with felt tip marking pen.
- B. Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.
- C. Legibly mark drawings to record actual construction:
 - 1. Field changes of dimension and detail.
 - 2. Changes made by Field Order or by Change Order.
 - 3. Details not on original contract drawings.

1.6 SUBMITTAL

At Contract Close-out, Record Documents shall be included on the two (2) USB flash drives as requested in Section 01 77 19 - Contract Closeout.

PART TWO – PRODUCTS

Not Used

PART THREE – EXECUTION

Not Used

END OF SECTION

DEMOLITION

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Provide all demolition work required to perform the work shown on the Drawings, specified herein and as required for a complete and proper installation.

1.2 INSPECTION

- A. Prior to bidding, the Contractor shall visit the job site and determine demolition requirements for the completion of construction. No extra compensation shall be granted for work which the Contractor could have foreseen by close, conscientious investigation of the site. Unforeseen conditions discovered after conscientious investigations shall be immediately brought to the attention of the Architect. Work resulting from such unforeseen conditions shall be performed as directed by the Architect as per the General Conditions of the contract for construction.

PART TWO - PRODUCTS

2.1 DESCRIPTION

- A. Provide all materials, labor, equipment and related items necessary to complete the work indicated on drawings and/or specified.

PART THREE - EXECUTION

3.1 DEMOLITION

- A. Complete demolition as indicated on the drawings and as required to complete alterations. Inspect all areas of proposed demolition to accurately determine the locations and extent of demolition required. Provide protection against damage to existing appurtenances which are to remain.
- B. Take accurate field measurements in locating areas to be demolished. Coordinate demolition work with work of other trades. Provide adjustments in the work as necessary to assure proper installation of new materials in connection with demolitions.

3.2 CUTTING AND PATCHING

- A. Execute cutting, fitting or patching of work required to make several parts fit properly, uncover work to provide installation of new work or to remove and replace defective work for Contract Documents conformance.
- B. Inspect existing conditions of work including elements subject to movement or damage during demolition and cutting and patching. After uncovered work, inspect conditions affecting installation of new products and existing material to be reinstalled. Do not endanger existing building by cutting except as shown on drawings.

- C. Prior to cutting provide: Shoring, bracing and support as required to maintain structural integrity of Project, protection for other portions of Project, and protection from elements.
- D. Restore work which has been cut or removed and install new products to provide completed work in accord with requirements of Contract Documents.

END OF SECTION

PART ONE - GENERAL

1.1 GENERAL

- A. Work Included: This section covers all cast-in-place, reinforced and non-reinforced concrete construction and pre-cast splash blocks as shown and specified.

1.2 REFERENCE STANDARDS

- A. ACI 318 "Building Code Requirements for Reinforced Concrete".
- B. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

1.3 DELIVERY, STORAGE AND HANDLING OF MATERIALS

- A. All materials shall be so delivered, stored and handled as to prevent the inclusion of foreign materials and the damage of materials by water or breakage. Package materials shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of water or other damage shall be rejected. All materials shall be of the respective quantities specified herein. Frozen or partially frozen aggregates shall not be used.

1.4 SUBMITTALS

- A. The contractor shall submit one hard copy (not to be returned) and one electronic copy in PDF format as per Section 01 33 23, through an approved testing laboratory, the proposed concrete mix to be used to the architect for approval. The proposed concrete mix must be proved by 3 cylinder tests in accordance with ASTM C-31. The owner shall pay for all design mixes and cylinder tests.
- B. Reinforcing steel fabricator shall submit one hard copy (not to be returned) and one electronic copy in PDF format as per Section 01 33 23 of detailed shop drawings for approval by the Architect on reinforcing bars and anchor bolts seating plans before fabrication or shipment.

PART TWO - PRODUCTS

- 2.1 CONCRETE: Concrete for interior slabs and footings shall have a 28-day minimum compressive strength of 3000 psi. Maximum water-cement ratio - .53 by weight. Exterior concrete shall have a 28 day minimum compressive strength of 4000 psi w/air entrainment of 6% $\pm$ 1%. Maximum water-cement ratio - .50 by weight. No other admixtures shall be used without approval of Architect.

- A. Portland cement shall conform to ASTM C-150, Type I/II, or ASTM C-595, Type IL.
- B. Water shall be potable.
- C. Aggregate shall conform to ASTM C-33.

2.2 REINFORCING STEEL

- A. Deformed bars shall conform to ASTM A615, Grade 60.
- B. Welded wire fabric shall conform to ASTM A-185. Provide 6 x 6 W1.4 x W1.4 in all floor slabs unless noted otherwise.

2.3 VAPOR BARRIER: See specification section 07 26 16.

2.4 FLOOR SEALER: MasterKure CC 180 WB as manufactured by BASF.

2.5 CURING COMPOUND: 1100-Clear by W.R. Meadows.

2.6 CONSTRUCTION JOINTS OR CONTROL JOINT: Provide 24 gage galvanized preformed steel screed keys as manufactured by Dayton Superior or approved equal. Provide steel stakes and splice plates as required by manufacturer.

2.7 Premolded expansion joint material shall be asphalt impregnated expansion joint material to meet ASTM specification D-1751-73. Expansion joint material shall have a “zip strip” or “tear tab” for ease in installation of backer rod and sealant.

PART THREE - EXECUTION

3.1 FORMS AND SCREEDS

- A. Form shall be so constructed that the finished concrete will conform to the shapes, lines, grades, and dimensions indicated on the drawings.
- B. Set all screeds with instrument. Wet screeds are unacceptable.

3.2 PLACING REINFORCEMENT

- A. Reinforcing shall be unpainted and uncoated, free from rust or scale and shall be cleaned and straightened before being shaped and put into position.
- B. Reinforcing shall be accurately positioned and securely tied.

3.3 CONCRETE MIXING

- A. Concrete shall be Ready-Mix in accordance with ASTM C-94.

3.4 CONCRETE PLACING

- A. Notify Architect 36 hours prior to placing to permit inspection of forms and reinforcing.
- B. Concrete shall be handled from the mixer to the forms as rapidly as possible by methods which shall prevent the separation of ingredients.
- C. Consolidate concrete as required.

3.5 CURING

- A. Moisture Cure: The slabs shall be moisture cured by ponding, continuous sprinkling and application of absorptive mats or 1 1/2 inch of sand kept continuously wet. Whichever method used, the slabs shall be kept continuously wet for 7 days.
- B. Curing Compound: Provide curing compound as recommended by manufacturer.

3.6 FINISHES: Interior slabs shall receive a steel trowel finish typically. Exterior slabs shall receive a light broomed finish over a steel trowel finish.

- A. Apply curing compound to interior and exterior concrete. Curing compound shall not be applied to slabs to receive floor hardener.

3.7 TESTING

- A. Samples and tests of the concrete shall be made by an approved independent testing and inspection laboratory. At Contractor's expense, a certified ACI technician shall take test cylinders at the job site. All other test shall be at paid for by the owner unless noted otherwise. Not less than one test for 40 cu. yd. of concrete, or fraction thereof, will be required, and in any event not less than one test for each day's pour. Not less than four specimens will be made for each test. Specimens shall be made and cured in accordance with current ASTM Specifications C-39 and C-31. A slump test shall be made for each set of test cylinders.
- B. Test cylinders shall be made in accordance with ASTM C-31, latest edition. Test one cylinder at 7 days, one at 14 days and two at 28 days. Test cylinders shall be cast on the project site and cured under conditions approaching that of concrete poured on job as nearly as possible. If average strength of test cylinders falls below strength called for, the Architect shall have the right to order removal and replacement of any defective concrete at the contractor's expense.

END OF SECTION

METAL FABRICATIONS

PART ONE - GENERAL

1.1 SCOPE

1.1.1 Work included: Provide miscellaneous metal work, complete, including:

- a. Pipe railings and handrails.
- b. Steel supports for work of other trades.
- c. Miscellaneous metal steel attachments, anchors, plates, angles, etc.
- d. Anchors, angles, bolts, expansion shields for items in this section only, and other accessories shown in details and/or required for the complete installation of all work.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

Concrete Section 03 31 00

1.3 SUBMITTALS

1.3.1 Comply with provisions of Section 01 33 23.

1.3.2 Product Data: Submit for products used in miscellaneous metal fabrications, including paint products and grout.

1.3.3 Shop drawings: Submit shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work. Include plans, elevations, sections, and details of fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

1.4 PROJECT CONDITIONS

1.4.1 Field Measurements:

- a. Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- b. Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART TWO - PRODUCTS

2.1 MATERIALS

2.1.1 Metal surfaces, general: For metal fabrications exposed to view upon completion of work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, and roughness.

- a. Miscellaneous Steel Bars, Rods and Shapes: ASTM A36, A283, A108, A663, A501, and A575, as applicable.
- b. Pipe: ASTM A53 black finish steel pipe, standard weight (Schedule 40).
- c. Bolts and Nuts: ASTM A307, Grade A. High strength bolts: ASTM A 325. Hot-dip galvanize all items in accordance with ASTM A 153.
- d. Expansion Bolts Wedge Anchors: Ramset "Trubolt" or Hilti "Kwik Bolt".
- e. Adhesive Anchors: Hilti "HVA".
- f. Expansion Shields: F.S. FF-S-325.
- g. Anchor Bolts: Furnish and deliver to site, anchor bolts and other items to be embedded in concrete. Provide necessary shop details and diagrams for concrete forms and, if required, provide templates to insure proper and accurate locations and setting of anchor bolts.
- h. Toggle Bolts: Tumble-wing type F.S. FF-B-588 type, class and style as required.
- i. Lock Washers: F.S. FF-W-84, helical spring type carbon steel.
- j. Welding Rods and Electrodes: Select in accordance with AWS specifications for metal alloy to be welded.
- k. Metal Stair Pans: For integral riser and treads up to 5'0" in length use 14 gage steel; for lengths up to 8'0" use 12 gage steel.
- l. Miscellaneous Items: Furnish bent or otherwise custom fabricated bolts, plates, z-clips, anchors, hangers, dowels and other miscellaneous steel shapes as required for framing and supporting work and for anchoring or securing work to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Section 06 10 00.
- m. Shop Paint: Lead free, alkyd primer; Tnemec 10-99, Southern coatings Enviro-Guard 1-2900, or approved equal, meeting performance requirements of F.S. TT-P-86, and passing ASTM B117 after 500 hours. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09 91 00.
- n. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.
- o. Non-shrink Nonmetallic Grout: Master Builders "Masterflow 713", Euclid "Euco N.S. Grout", L&M "Crystex", or U.S. Grout "Five Star Grout", or Sonneborn "SonogROUT", or W.R. Meadows "Sealtight 588 Grout".

2.2 FABRICATIONS, GENERAL

2.2.1 Workmanship: Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

2.2.2 Form exposed work true to line and level with accurate angles and surfaces and straight, sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

- 2.2.3 Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- 2.2.4 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown, or if not shown, Phillips flat-head (countersunk) screws or bolts. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use. Cut reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware and similar items.
- 2.2.5 Shop painting:
- Shop paint miscellaneous metal work, except concealed metal work, members or portion of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
 - Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 or SSPC SP-3.
 - Remove oil, grease and similar contaminants in accordance with SSPC SP-1.
 - Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

2.3 MISCELLANEOUS METAL FABRICATIONS

2.3.1 Pipe Railings and Handrails:

- Fabricate of standard weight steel pipe to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.
- Interconnect railing and handrail members of butt-welding or welding with internal connectors.
- Form changes in direction by insertion of prefabricated elbow fittings, by radius bends, by mitering at elbow bends, or by bending.
- Provide wall returns at ends of wall-mounted handrails.
- Close exposed ends of pipe by welding 3/16" thick steel plate in place or by use of prefabricated fittings.
- Brackets, flanges, fittings, anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete.
- Prime as specified in this section.

2.3.2 Steel supports: Provide structural steel lintels, channels, braces, angles, etc. as indicated and assemble as detailed. Secure all connections to provide rigid supports for all items required including supports not specifically specified in other sections.

2.3.3 Mechanical equipment frames: All mechanical equipment frames or miscellaneous steel required to complete the mechanical equipment installation shall be provided and detailed by the steel fabricator. The mechanical equipment contractor shall provide all necessary weights and dimensions to the steel fabricator.

PART THREE - EXECUTION

3.1 PREPARATION

- 3.1.1 Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to site.
- 3.1.2 Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.2 INSTALLATION

- 3.2.1 Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications or frames to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- 3.2.2 Cutting, fitting, placement: Perform cutting, drilling and fitting required for installation. Set metal fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true, and free of rack; measured from established lines and levels.
- 3.2.3 Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- 3.2.4 Setting loose plates:
 - a. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom of surface of bearing plates.
 - b. Set loose leveling and bearing plates on wedges, or other adjustable devices. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
- 3.2.5 Steel pipe railings and handrails: Set pipe in concrete in non-corrosive pipe sleeves with non-shrink grout or anchor to supports as indicated or required by project conditions. Secure handrails to wall with wall brackets and end fittings.

3.3 TOUCH UP SHOP PAINTING

- 3.3.1 Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint, and paint exposed areas with same materials as used for shop painting.

END OF SECTION

LUMBER

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all wood, nails, bolts, screws, framing anchors, and other rough hardware, and all other items needed for rough and finished carpentry in this Work but not specifically described in other Sections of these Specifications.

1.1.2 Related work described elsewhere:

1. Rough Carpentry Section 06 10 00
2. Finish Carpentry Section 06 20 00

1.2 QUALITY ASSURANCE

1.2.1 Standards: Comply with all pertinent codes and regulations, and with the standards listed in this Section or as described by the National Grading Rule as published by the Southern Pine Inspection Bureau.

1.2.2 Conflicting requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standard or these specifications, the provisions of the more stringent shall govern.

1.3 SUBMITTALS

Make all proposals for substitution in strict accordance with the provisions of Section 01 33 23 of these Specifications.

1.4 PRODUCT HANDLING

1.4.1 Protection:

1. Use all means necessary to protect lumber materials before, during, and after delivery to the job site, and to protect the installed work and materials of all other trades.
2. Deliver the materials to the job site and store, all in a safe area, out of the way of traffic, and shored up off the ground surface.
3. Identify all framing lumber as to grades, and store all grades separately from other grades.
4. Protect all metal products with adequate waterproof outer wrappings.
5. Use extreme care in the off-loading of lumber to prevent damage splitting, and breaking of materials.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 GRADE STAMPS

- 2.1.1 Framing lumber: Identify all framing lumber by the grade stamp of Southern Yellow Pine or West Coast Lumber.
- 2.1.2 Plywood: Identify all plywood as to species, grade, and glue type by the stamp of the American Plywood Association.
- 2.1.3 Other: Identify all other materials of this Section by the appropriate stamp of the agency listed in the reference standards, or by such other means as are approved by the Architect.

2.2 MATERIALS

All materials, unless otherwise specifically approved in advance by the Architect, shall meet or exceed the following:

<u>Item:</u>	<u>Description:</u>
Plates (in contact with concrete or masonry)	Pressure-treated Southern Pine
Studs and headers	Southern Pine #2 KD or Spruce #1
All other framing members	Southern Pine #2 KD
Plywood – concealed decking	C-D with exterior glue, group 4 30/12
Plywood – interior finish	A-B with one side sanded
Pressure-treated wood	Wolman CCA preservative by the Koppers Co. Pressure impregnated in accordance with AWPA Standard C-2 (or approved equal)
Steel hardware	ASTM 47 and A36 (use galvanized at exterior locations)
Machine bolts	ASTM A307
Lag bolts	Federal Spec. FF-B-561
Nails	Common (except as noted), Federal Spec. FF-N-1-1 (use galvanized at exterior locations)

2.3 OTHER MATERIALS

All other materials, not specifically described but required for a complete and proper installation as indicated on the Drawings, shall be new, suitable for intended use, and subject to the approval of the Architect.

PART THREE - EXECUTION

3.1 DELIVERIES

- 3.1.1 Stockpiling: Stockpile all materials sufficiently in advance of need to ensure their availability in a timely manner for this work.
- 3.1.2 Delivery schedule: Make as many trips to the job site as are necessary to deliver all materials of this Section in a timely manner to ensure orderly progress of the total work.
- 3.1.3 Wood roof cants shall be cut 4 x 4 treated wood in maximum 8' lengths.

3.2 COMPLIANCE

Do not permit materials not complying with the provisions of this Section of these specifications to be brought onto or to be stored at the job site. Immediately remove from the job site all non-complying materials and replace them with materials meeting the requirements of this Section.

END OF SECTION

ROUGH CARPENTRY

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Install all wood framing indicated on the Drawings or required for a complete and operable facility.

1.1.2 Related work described elsewhere:

- | | | |
|----|--|------------------|
| 1. | Concrete Formwork | Section 03 11 00 |
| 2. | Lumber | Section 06 06 00 |
| 3. | Installation of
Wood Doors and Frames | Section 06 20 00 |

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of workers: Provide sufficient workmen and supervisors who shall be present at all times during execution of this portion of the Work, and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

1.2.2 Rejection: In the acceptance or rejection of rough carpentry, the Architect will make no allowance for lack of skill on the part of workmen.

1.3 PRODUCT HANDLING

1.3.1 Protection:

1.3.1.1 Store all materials in such a manner as to ensure proper ventilation and drainage, and to protect against damage and the weather.

1.3.1.2 Keep all materials clearly identified with all grade marks legible. Keep all damaged material clearly identified as damaged, and store separately to prevent its inadvertent use.

1.3.1.3 Do not allow installation of damaged or otherwise non-complying materials.

1.3.1.4 Use all means necessary to protect the installed work and materials of all other trades.

1.3.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

Refer to Section 06 06 00 – LUMBER

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 WORKMANSHIP

3.2.1 General: All rough carpentry shall produce joints true, tight, and well nailed, with all members assembled in accordance with the Drawings and with all pertinent codes and regulations.

3.2.2 Selection of lumber pieces:

3.2.2.1 Carefully select all members. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making connections.

3.2.2.2 Cut out and discard all defects which will render a piece unable to serve its intended function. 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.

3.2.3 Shimming: Do not shim sills, joists, short studs, trimmers, headers, lintels, or other framing components.

3.3 TREATED LUMBER

3.3.1 General: Use only treated lumber for all wood bucks and nailing grounds (other than Foundation grade Redwood) in, or in contact with, concrete.

3.3.2 Treatment:

3.3.2.1 Treat all wood, as called for on Drawings and in the specifications by spraying with the preservative specified in Section 06 06 00.

3.3.2.2 Perform all treatment in strict accordance with the published recommendations of the manufacturer of the treatment preservative.

3.4 GENERAL FRAMING

3.4.1 General:

3.4.1.1 In addition to all framing operations normal to fabrication and erection indicated on the Drawings, install all backing required for work of other trades.

3.4.1.2 Set all horizontal or sloped members with crown up.

3.4.1.3 Do not notch, bore, or cut members for pipes, ducts, conduits, or other reasons except as shown on the Drawings or as specifically approved in advance by the Architect.

3.4.2 Bearings:

3.4.2.1 Make all bearings full unless otherwise indicated on the Drawings.

3.4.2.2 Finish all bearing surfaces on which structural members are to rest so as to give sure and even support. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

3.5 BLOCKING

3.5.1 Blocking:

3.5.1.1 Install all blocking required to support all items of finish, to include, but not limited to, all door stops, towel or grab bars, wall hung shelving, etc., and to cut off all concealed draft openings, both vertical and horizontal, between ceiling and floor areas.

3.5.1.2 Where treated blocking is in contact with metal structure, angles, roof deck, etc., blocking shall be wrapped in 15 lb. building felt.

3.6 INSTALLATION OF PLYWOOD

3.6.1 Placement:

3.6.1.1 Place all plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise specifically indicated on the Drawings.

3.6.1.2 Center joints accurately over supports. Unless otherwise specifically shown on the Drawings, stagger the end joints of plywood panels to achieve a minimum of continuity of joints.

3.6.2 Protection of plywood: Protect all plywood from moisture by use of all required waterproof coverings until the plywood has in turn been covered with the next succeeding component or finish.

3.7 FASTENING

3.7.1 Nailing: Do all nailing without splitting wood. Pre-bore as required. Replace all split members.

3.7.2 Bolting: Drill holes 1/16 inch larger in diameter than the bolts being used. Drill straight and true from one side only. Bolt threads shall not bear on wood. Use washers under head and nut where both bear on wood; use washers under all nuts.

3.7.3 Screws: For lag screws and wood screws, pre-bore same diameter as root of thread; enlarge holes to shank diameter for length of shank. Screw, do not drive, all lag screws and wood screws.

3.8 CLEANING UP

3.8.1 General: Keep the premises in a neat, safe, and orderly condition at all times during execution of this portion of the Work, free from accumulations of sawdust, cut ends, and debris.

3.8.2 Sweeping:

3.8.2.1 At the end of each working day, and more often if necessary, thoroughly sweep all surfaces where refuse from this portion of the Work has settled.

3.8.2.2 Remove the refuse to the area of the job site set aside for its storage.

3.8.2.3 Upon completion of this portion of the Work, thoroughly broom clean all surfaces.

END OF SECTION

FINISH CARPENTRY

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all finish carpentry needed for a complete and proper installation including, but not necessarily limited to:

1. Fitting and installing all wood doors.
2. Installing all finish hardware.

1.1.2 Related work described elsewhere:

- | | | |
|----|----------------------------|------------------|
| 1. | Furnishing Wood Doors | Section 08 14 29 |
| 2. | Furnishing Finish Hardware | Section 08 71 00 |

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of personnel:

1.2.1.1 Throughout progress of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.

1.2.1.2 In actual installation of the Work of this Section, use adequate number of skilled workmen to ensure installation in strict accordance with the approved design and the approved recommendations of the material's manufacturers.

1.2.1.3 Qualifications of finish hardware adjuster: Provide the services of an AHC member of Door and Window Institute, or an equally qualified individual approved in advance by the Architect.

1.3 PRODUCT HANDLING

1.3.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the work and materials of all other trades.

1.3.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 FASTENERS

2.1.1 Fasteners shall be the appropriate size finish or casing nails and/or screws.

2.1.2 Bright finish nails may be used for interior work and smooth finish galvanized casing nails used for exterior work. Heads of all nails shall be counter-sunk and holes filled.

- 2.1.3 Screws shall be the appropriate size and finish with flat counter-sinking heads installed flush with finish surface unless designated to be counter-sunk and holes filled.
- 2.2 LUMBER
- 2.2.1 Trim and finish lumber: Wood fascias, door frames, shelving and all other trim and finish lumber shall be B or better Southern Yellow Pine or West Coast Fir in corresponding grade.
- 2.2.2 Moisture content: Moisture content for rough framing lumber shall not exceed 19%. Moisture content for trim and finish lumber shall not exceed 14%.
- 2.2.3 Protection of lumber: All lumber in contact with concrete or masonry or where called for on the drawings shall be given a pressure treatment against deterioration by "wolmanizing" or a similar and approved equal treatment.
- 2.2.4 Hardwood plywood: All plywood used to be installed as shown on the drawings. Provide grades 2-2 interior birch plywood where surfaces are exposed. 2-3 grade birch plywood may be used at all grades where one side is not exposed. Exposed plywood to be suitable for a smooth paint or stained surface.
- 2.2.5 Softwood plywood: PS20; custom grade in accordance with AWI; maximum moisture content of 8% for interior work and 12 percent for exterior work. Woodwork called to be painted shall be "C" or better white pine, Ponderosa pine or as otherwise noted.
- 2.3 PROTECTION
- 2.3.1 All work and materials shall be protected from weather, grease, stain, abuse, etc., after erection by temporary shielding or covering.
- 2.3.2 See Painting, Section 09 91 00, for priming requirements before erection and immediately thereafter.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 INSTALLATION OF WOOD DOORS

- 3.2.1 Initial inspection of doors: Prior to start of installation of each door, carefully inspect the door and verify:
1. That the door furnished is the proper door for the opening, as described on the Door Schedule in the Drawings.
 2. That the door is in sound condition, unblemished, without warp, twist, bow, or other attributes causing it to be rejected upon installation.

- 3.2.2 Handling: Carry wood doors, do not drag them. Use extreme care in handling to prevent damage.
- 3.2.3 Fitting: Trim all wood doors as necessary to provide a uniform clearance of between 1/8" and 3/16" at jambs and head, and a uniform clearance at the threshold or floor to properly clear the floor covering described on the Finish Schedule in the Drawings.
- 3.2.4 Installing: For each door, verify the hardware type as described on the Door Schedule in the Drawings and verify that hardware actually supplied is the hardware specified. Using only the specified hinges or butts, and the proper equipment for the purpose, install the door into the opening with the following hinge or butt locations throughout the Work:

- | | |
|---------------------------------------|--|
| 1. Top hinge or butt: | The center of the hinge or butt not more than 11" below the top of the door; |
| 2. Bottom hinge or butt: | The center of the hinge or butt not more than 13" above the finish floor; |
| 3. Intermediate hinge, butt or pivot: | Equidistant between top and bottom hinge, butt or pivot. |

3.2.5 Finishing:

- 3.2.5.1 With fine sandpaper, working only in direction of the grain of the wood, remove all rough edges resulting from door trimming and leave the installed door in condition to receive its final finish.
- 3.2.5.2 Carefully touch-up all trimmed surfaces, applying a finish equal in all respects to the finish specified in Section 09 91 00.

3.3 INSTALLATION OF OTHER FINISH HARDWARE

- 3.3.1 Location: Using only the specified finish hardware, and the proper equipment for the purpose, install all other finish hardware in the following locations throughout the Work:

- | | |
|--------------------------------------|--|
| 1. Door pulls or plates: | Centered 40 5/16" above the finish floor. |
| 2. Door closing devices: | Install and adjust in strict accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls or corridors shall have the closer mounted on the room side of the door. |
| 3. Extension lever flush bolts: | In the edge of the door. Center to bolt fronts 12" from bottom and 12" from top edge of the door. |
| 4. Kick plates: | On single-acting doors with kick plate on push side. On double-acting doors with kick plate on both sides. |
| 5. Mortise dead-lock strike: | Center 60" above the finish floor. |
| 6. Knob lock and knob latch strikes: | Center 40 5/16" above the finish floor. |
| 7. Panic bolt cross bars: | Align in horizontal position with top and bottom bolts and rods aligned vertically. Install the centerline of strike 40 5/16" above finish floor. |
| 8. Push plates: | Centered 48" above the finish floor. |
| 9. Other hardware items: | Install as directed not described above. |

3.3.2 Anchoring: Anchor all components firmly into position for long life under hard use. Use only the anchoring devices furnished with the hardware item, unless otherwise specifically directed.

3.4 WORKMANSHIP

3.4.1 All items of finish carpentry shall be installed with the latest practices and methods to accomplish a first class installation.

3.4.2 Any finish work showing hammer marks, open cut joints, joints that are not mitered, etc., or defects in material will be rejected and replaced at no additional cost to Owner.

3.4.3 All work shall be done by workmen who are skilled in the trade. Nails shall be set and holes filled.

3.5 INSPECTION, ADJUSTMENT, AND REPORTING

3.5.1 General: Inspect each item of installed finish hardware. Verify that each such item has been installed in strict accordance with the manufacturer's recommendations, is in proper condition, and functions in its intended manner.

END OF SECTION

MILLWORK

PART ONE – GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Furnish and install all millwork indicated on the Drawings or required for a complete and proper installation including, but not necessarily limited to:

1. Counters

1.1.2 Related work described elsewhere:

1. Finish Carpentry Section 06 20 00

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of personnel:

1.2.1.1 Throughout progress of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.

1.2.1.2 In actual installation of the work of this Section, use adequate number of skilled workmen to ensure installation in strict accordance with the approved design and the approved recommendations of the materials manufacturers.

1.3 PRODUCT HANDLING

1.3.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the work and materials of all other trades.

1.3.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.4 SUBMITTALS

1.4.1 Comply with the provisions of Section 01 33 23.

1.4.2 Submit samples of solid surfacing and plastic laminate.

1.4.3 Submit shop drawings showing details, materials, dimensions, and fabrication of millwork.

PART TWO - PRODUCTS

2.1 LUMBER FOR MILLWORK, TRIM AND FINISH

- 2.1.1 "B" and better, soft textured Southern Yellow Pine or clear West Coast Fir, except where shown otherwise.

2.2 INTERIOR GRADE PLYWOOD AND PARTICLE CORE BOARD

- 2.2.1 All plywood, unless shown otherwise: Interior Grade veneer core birch plywood conforming to the requirements of Product Standard PS-1 of the U.S. Department of Commerce, graded in accordance with the grading rules of the American Plywood Association.

- 2.2.2 Both surfaces exposed: Use A-A or A-B grade interior fir.

- 2.2.3 One surface exposed: Use A-D grade fir plywood as shown.

- 2.2.4 Particle board to receive laminated plastic surfacing and for shelves and cabinets. Medium density (45 pounds per square foot) conforming to requirements of Commercial Standard CS 236, TIMBLEND by Weyerhaeuser, or approved equal.

2.3 HARDBOARD: 1/4" thick.

2.4 SOLID POLYMER MATERIAL:

Solid composite sheet comprised of acrylic resin and mineral fillers, integrally colored.

- 2.4.1 Product: Solid surfacing as manufactured by Wilsonart or Architect approved substitute, Color and finish selected by Architect from Price Groups 1 through 3.

- 2.4.2 Adhesive: as recommended by manufacturer for substrate indicated.

2.5 PLASTIC LAMINATE

High pressure laminated plastic sheets, 0.048 inch thick on all exposed surfaces and edges.

- 2.5.1 Manufacturer: Wilsonart International, or approved equal.

- 2.5.2 Color and pattern as selected by Architect and Owner from manufacturer's standard and premium laminate colors.

2.6 PRESSURE TREATED WOOD:

In accordance with Section 06 06 00.

2.7 ROUGH HARDWARE

Provide nails, bolts, screws, brackets, inserts, anchor bolts, buck anchors, and other rough hardware items in types, sizes, and quantities as shown on the Drawings or as required for secure anchorage of item.

2.8 WOOD MILLWORK

- 2.8.1 All millwork shall be of thoroughly dry lumber without imperfections of any kind as to the specified color, finish, or quality of the wood, and free from warps. All glue used for the fabrication of all millwork shall be of the highest grade of waterproof or marine glue. All surfaces shall be machine sanded and where the machine cannot reach surface it shall be hand sanded. Millwork shall be securely fastened in place to walls and/or floors with suitable anchoring devices so that no movement or displacement will result from use.
- 2.8.2 All material shall be thoroughly kiln dried before being milled and shall be protected from moisture or dampness of any nature until completion of the building. No finish material is to be brought to building or installed in building until the building is in a dry and suitable condition to prevent damage to finish.
- 2.8.3 Millwork shall conform to design and details shown. Where practicable, work shall be finished and assembled at mill. All millwork shall be finished smooth and free from machine or tool marks that will show through the finish. All nail heads shall be set to receive putty.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 INSTALLATION, GENERAL

- 3.2.1 Set finish nails below finish surfaces of trim, molding, and other exposed surfaces.
- 3.2.2 Leave no hammer marks or other defacement in finished surfaces. Torn grain and tool-marked exposed surfaces will not be accepted.
- 3.2.3 Fill exposed edges of particleboard with rock-hard putty. Leave all exposed surfaces smooth and ready for painting.
- 3.2.4 Verify all measurements at the job before making installation.
- 3.2.5 Do not store or install millwork in any part of the building until concrete, masonry, and plaster work is dry.
- 3.2.6 Use bolts to secure wood blocking or nailers to steel.
- 3.2.7 Where wood furring strips are required, install true to line, level, plumb and well secured in place.
- 3.2.8 Make all interior finish joints smooth and properly membered or mitered.
- 3.2.9 Install all lengths of lumber without joints on straight runs where possible but where joints are necessary, make them at an angle of 45 degrees against the light.

3.2.10 Shop-assemble millwork for delivery to the jobsite in sizes easily handled and to ensure passage through building openings, or job fabricate at contractor's option.

3.3 SOLID SURFACING AND PLASTIC LAMINATE SURFACING

3.3.1 Install solid surfacing for countertops, backsplashes and aprons as shown on the Drawings.

3.3.2 Apply the surfacing to the backing using waterproof contact cement.

3.3.3 Use butt joints.

3.3.4 Neatly join and fit corners without raw edges showing.

3.4 WORKMANSHIP

All work, including job erection, shall be done by workmen who are skilled in the trade.

3.5 COORDINATION

Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

END OF SECTION

THERMAL INSULATION

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all building insulation required for this work including, but not necessarily limited to:

1. Fiberglass batt insulation above ceilings.
2. Wall cavity insulation.

1.2 PRODUCT HANDLING

1.2.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.2.2 Delivery and storage: Deliver materials to the job site, and store in a safe dry place with all labels intact and legible at time of installation.

1.2.3 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 INSULATION MATERIALS

2.1.1 Sound attenuation batts: Shall match thickness of walls where called for on drawings as manufactured by Owens-Corning or approved equal. Provide 4 inch sound attenuation batts above ceilings.

2.2 OTHER MATERIALS

All other materials, not specifically described but required for a complete and proper installation of the Work of this Section, shall be as selected by the Contractor subject to the approval of the Architect.

PART THREE - EXECUTION

3.1 INSPECTION

Examine the areas and conditions under which work of this Section will be installed. Correct Conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- 3.2.1 Sound batt insulation: Install in all interior walls to 8" above ceiling and above ceilings 2'0" on each side of all interior walls. Attach sound batts to stud walls either with acoustical sealant applied to gypsum board or by opening flanges of batt insulation and attaching to metal studs with drywall screws.

3.3 VERIFICATION

Upon completion of the installation in each area, visually inspect and verify that all insulation is complete and properly installed.

END OF SECTION

METAL SOFFIT

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Provide metal soffit system including all accessories, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of Manufacturers: Products used in the work of this Section shall be produced by Manufacturers regularly engaged in manufacture of similar products and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Product data: Within 30 calendar days after award of the contract, submit:

- A. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
- B. Manufacturer's recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.
- C. Complete materials list of all items proposed to be furnished and installed under this Section.
- D. Shop drawings and sufficient dimensional data to enable proper co-ordination of installation of concealed items of support.

1.5 PRODUCT HANDLING

1.5.1 Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect work and materials of all other trades.

1.5.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 GENERAL

All soffit panels, trim pieces and accessories shall be as manufactured by Fabral, 3449 Hempland Rd., Lancaster, PA 17604-4608, or Architect approved equal.

2.2 SOFFIT PANELS

Provide solid Posi-Lock Panels of .024 steel accurately roll formed to a depth of 3/16" and effective width of 14" with a V-groove at 4-3/4" on center. Furnish with interlocking design to hide fasteners.

2.3 FINISH

Provide Kynar PVDF resin fluorescarbon coating with epoxy primer, factory applied coating. Furnish the manufacturers non-prorated twenty (20) year warranty against cracking, checking, peeling, or losing adhesion. Color shall be selected from manufacturer's nine standard colors.

2.4 STRUCTURAL FRAMING

Provide .050" aluminum structural framing members as shown on details. Hat section 1-3/4" high, 2" base and 1-1/8" crown and channel section 1-1/4" high x 1" wide; fastened at intersections with two 1/4" x 3/4" tek screws each side per connection.

2.5 ACCESSORIES

- A. Hat section furring strip/stringers, roll formed .050" aluminum 3005-H281, 1-3/4" high, 2" base x 1-1/8" crown.
- B. Custom brake formed trim accessories with protective strippable coating for field brake forming of .032" aluminum.
- C. Black 1" thick EPDM top and bottom closure strips.
- D. Aluminum hold down clips.
- E. Splice kits (if needed).
- F. Shelf drips and corner caps as required.

PART THREE - EXECUTION

3.1 Installation of soffit shall follow printed manufacturer's recommendations as approved by the Architect.

3.2 Erect the entire installation straight and true in accordance with standard construction procedures as approved by the Architect.

3.3 All surfaces shall be cleaned thoroughly prior to acceptance of building.

END OF SECTION

INSULATED INFILL PANELS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide infill panels for windows consisting of metal skins laminated to stabilizer substrates with an insulating core material, complete in place, as indicated on the Drawings, specified herein, or otherwise needed for a complete and proper installation of the work of this Section.

1.1.2 Related work described elsewhere:

- | | | |
|----|-----------------------------------|------------------|
| 1. | Sealants and Caulkings | Section 07 92 00 |
| 2. | Aluminum Entrances and Storefront | Section 08 41 00 |

1.2 QUALITY ASSURANCE

1.2.1 Reference standards:

1. American Sociate of Testing Materials (ASTM)
 - a. E330-84: Structural Performance of Exterior Windows, Curtain Walls and Doors under the influence of wind loads.
 - b. D1781-76: Climbing Drum Peel Test for Adhesives.
 - c. D3363-74: Method for Film Hardness by Pencil Test.
 - d. D2794-90: Resistance of Organic Coating sto the Effects of Rapid Deformation (Impact).
 - e. D3359-90: Method for Measuring Adhesion by the tape test.

1.2.2 Qualification of manufacturer: Use products in the work of this Section produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.3 Qualifications of installers: Use skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with the requirements of Section 01 33 23.

1.3.2 Prompt data: No later than 30 calendar days after award of the contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Sufficient data to demonstrate compliance with all specified requirements.
3. Shop Drawings of the entire installation.
4. Samples of the specified finish.

5. Manufacturer's recommended methods of installation which, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the job.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 Panels – Laminated

1. Laminated metal faced Mapes-R panels as manufactured by Mapes Industries, Inc.

2.2 Finish

1. Finishes - Embossed
2. Exterior and Interior: Colorlume E (Baked Enamel)
3. Color as selected by architect.

2.3 Panel Fabrication

1. Substrate: 3/16" Tempered Hardboard
2. Insulating Core: 2.5# Density Polystyrene
3. Panel Thickness – 3/16"

2.4 ACCESSORIES

2.4.1 All accessories as recommended by the manufacturer for use as an infill panel component in the window system.

PART THREE - EXECUTION

3.1 INSPECTION

3.1.1 Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 ERECTION

3.2.1 All panels shall be set true and plumb by skilled mechanics in prepared openings and securely anchored in place in accordance with detailed approved shop drawings and approved manufacturer's instructions.

3.3 ADJUSTING AND CLEANING

3.3.1 Remove masking film as soon as possible after installation.

3.3.2 Just prior to final inspection, thoroughly clean all surfaces of all stains, dirt, oils and other foreign matter.

3.3.3 Sealants are specified under Section 07 92 00. Use G.E. Silpruf or equal. Vulcum is not acceptable.

END OF SECTION

FLASHING AND SHEET METAL

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Furnish and install the metal flashing and other sheet metal work as shown and called for on the drawings, as specified herein and as required to prevent penetration of water through the roof or exterior walls of the building and permit the proper control of discharged water.

1.2 QUALITY ASSURANCE

1.2.1 Standards: All flashings/edge metals shall meet ANSI/SPRI ES-1 as required by the International Building Code shall be applicable standard for method and quality work under this Section.

1.2.2 Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.3 Qualification of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with the pertinent provisions of Section 01 33 23.

1.3.2 Product data: Submit the following to the Architect for approval:

1. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 SHEET METAL

2.1.1 All metal edge and drainage components shall be as manufactured by Exceptional Metals, Saginaw, Michigan, or Architect approved equal.

2.1.2 Metal edge components shall be selected from manufacturer's standard details for fascia, coping, edge and termination.

2.1.3 Aluminum gutters and downspouts shall be fabricated as long as practical. Profile for gutters shall be manufacturer's standard. Gutters shall have a closed face. Concealed clips and straps for all gutters and downspouts shall be spaced not to exceed 6'0" o.c. Secure downspouts with straps at the top and bottom and in between as may be required to insure a proper installation. Provide expansion joints in gutters not to exceed 32'0" o.c.

2.1.4 Colors shall be selected from manufacturer's standard Kynar finish colors.

2.2 NAILS, RIVETS AND FASTENERS

2.2.1 Nails, rivets and fasteners shall be same material as metal to secured or shall be of durable compatible materials which are regularly recommended for the intended use. Nails shall be No. 10 gauge (.1019" diameter) or larger, needle point and long enough to penetrate wood 1" or masonry and concrete 2".

2.3 MATERIALS

2.3.1 Solder: Shall conform to ASM specification B32, Composition 50% tin and 50% lead.

2.3.2 Flux: Rosin, muriatic acid neutralized with zinc or an approved brand of soldering paste.

2.3.3 Bituminous Plastic Cement: Shall conform to Federal Specification SS-C-153, Type I. It shall be delivered in the manufacturer's original sealed containers.

PART THREE - EXECUTION

3.1 INSPECTION

3.1.1 Surface Conditions: Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Do not proceed with sheet metal installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

3.2.1 Install the work of this Section in strict accordance with the recommendations of the manufacturer as approved by the Architect.

3.3.1 Securely anchor in place by approved screw fastener.

END OF SECTION

1.1 SECTION INCLUDES

- ## 1.2 RELATED SECTIONS

- | | | |
|----|-------------------------|-----------------------|
| 1. | Joint Sealants | Section 07 92 00 |
| 2. | Gypsum Board Assemblies | Section 09 21 00 |
| 3. | Mechanical | Division Twenty Three |
| 4. | Electrical | Division Twenty Six |

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2000a.
- B. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2000a.
- C. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2000.
- D. ASTM E 1399 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems; 1997 (Reapproved 2000).
- E. ASTM E 1529 - Standard Test Methods for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies; 2000.
- F. ASTM E 1725 - Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components; 1995 (Reapproved 2001).
- G. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops; 1994.
- H. UL 1709 - Rapid Rise Fire Tests of Protection Materials for Structural Steel; 1994.
- I. ANSI/UL 2079 - Tests for Fire Resistance of Building Joint Systems; 1998.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Shop Drawings: For each different firestopping configuration, provide the following:
 - 1. Listing agency's detailed drawing showing opening, penetrating items, and firestopping materials, identified with listing agency's name and number or designation, fire rating achieved, and date of listing.
 - 2. Identify which rated assembly each system is to be used in.
 - 3. Any installation instructions that are not included on the detailed drawing.
 - 4. For proposed systems that do not conform strictly to the listing, submit listing agency's drawing marked to show modifications and stamped approved by firestop system manufacturer's fire protection engineer.
- C. Product Certificates: Submit certificates signed by firestop system manufacturer certifying that materials furnished comply with requirements.
- D. Product Data: Manufacturer's data sheets on each material to be used in firestop system systems, including:
 - 1. Listing numbers of systems in which each product is to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- E. Installer's Qualification Documentation.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Firm who is qualified by having experience, staff, and training to install the specified products, and who:
 - 1. Is acceptable to or licensed by manufacturer.
 - 2. Can provide a list of completed projects as evidence of experience; include project name and address, Owner's name and address, and Architect's name and phone number.
- B. Pre-Installation Meeting: Conduct a meeting at the project site to discuss installation conditions and requirements; require the attendance of all relevant installers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products until ready for installation in manufacturer's original unopened packaging, legibly marked with manufacturer's name and product identification, date of manufacture, lot number, shelf life, listing agency's classification marking, curing time, and mixing instructions if applicable.
- B. Store and handle in such a manner as to prevent deterioration or damage due to moisture, temperature changes, contaminants, and other causes; follow manufacturer's instructions.

1.7 PROJECT CONDITIONS

- A. Coordinate construction and cutting of openings so that each particular firestop system may be installed in accordance with its listing, including sizing, sleeves, and penetrating items.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install firestopping under environmental conditions outside manufacturer's absolute limits.
- C. Provide ventilation as required by firestopping manufacturer, including mechanical ventilation if required.

PART TWO – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers shall be 3M Fire Protection Products, Inc., SpecSeal Firestop Products, Hilti, Inc. or Architect approved equal.
- B. Single Source: All instances of a specific firestop system shall be made using products of the same manufacturer; where multiple installers (e.g. different subcontractors) are responsible for installation of firestopping, all installers shall use the same system made by the same manufacturer.

2.2 MATERIALS

- A. Scope:
 - 1. Rated Assemblies: Provide installed firestopping that limits the spread of fire, heat, smoke, and gasses through otherwise unprotected openings in rated assemblies, including walls, partitions, floors, roof/ceilings, etc.
 - 2. Construction Gaps: Provide installed firestopping that limits the spread of fire, heat, smoke, and gasses through otherwise unprotected gaps between adjacent rated assemblies, including:
 - a. Building expansion joints in walls and floors.
 - b. Interior walls to floor/roof deck above.
 - c. Intersection of floors and exterior walls.

PART THREE – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Conduct tests according to manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt and other foreign substances capable of impairing bond of firestopping.
- C. Verify that items penetrating fire rated assemblies are securely attached, including sleeves, supports, hangers, and clips.

- D. Verify that openings and adjacent areas are not obstructed by construction that would interfere with installation of firestopping, including ducts, piping, equipment, and other suspended construction.
- E. Verify that environmental conditions are safe and suitable for installation of firestopping.
- F. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Prepare substrates in accordance with manufacturer's instructions and recommendations.
- B. Install masking and temporary coverings as required to prevent contamination or defacement of adjacent surfaces due to firestopping installation.

3.3 INSTALLATION

- A. Install in strict accordance with manufacturer's detailed installation instructions and procedures.
- B. Install so that openings are completely filled and material is securely adhered.
- C. Where firestopping surface will be exposed to view, finish to a smooth, uniform surface flush with adjacent surfaces.
- D. After installation is complete, remove combustible forming materials and accessories that are not part of the listed system.
- E. Repair or replace defective installations to comply with requirements.
- F. At each through penetration, attach identification labels on both sides in location where label will be visible to anyone seeking to remove penetrating items or firestopping.
- G. Clean firestop materials off surfaces adjacent to openings as work progresses, using methods and cleaning materials approved in writing by firestop system manufacturer and which will not damage the surfaces being cleaned.
- H. Notify authority having jurisdiction when firestopping installation is ready for inspection; obtain advance approval of anticipated inspection dates and phasing, if any, required to allow subsequent construction to proceed.
- I. Do not cover firestopping with other construction until approval of authority having jurisdiction has been received.

3.4 PROTECTION

- A. Protect installed systems and products until completion of project; where subject to traffic, provide adequate protection board.
- B. Touch-up, repair or replace damaged systems and products before Substantial Completion.

END OF SECTION

JOINT SEALANTS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Throughout the Work, caulk and seal all joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of air and passage of moisture.

1.1.2 Related work described elsewhere:

- A. Adhere strictly to the caulking and sealant details shown on the Drawings.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of Manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to Architect.

1.2.2 Qualifications of installers:

1.2.2.1 Proper caulking and proper installation of sealants require that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.

1.2.2.2 For caulking and installation of sealant throughout the Work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the Drawings and the installation requirements called for in this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Manufacturers data: Within 30 calendar days after award of the Contract, submit:

- A. A complete materials list showing all items proposed to be furnished and installed under this Section.
- B. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.
- C. Specifications, installation instructions, and general recommendations from the materials manufacturer showing procedures under which it is proposed that the materials will be installed.

Upon approval by the Architect, the proposed installation procedures will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

1.4.1 Deliver and storage: Deliver all materials of this Section to the job site in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers. Do not retain on the job site any material which has exceeded the shelf life recommended by its manufacturer.

1.4.2 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.3 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 EXTERIOR VERTICAL APPLICATIONS

2.1.1 Metal to masonry: MasterSeal NP 1 as manufactured by BASF, Shakope, MN or approved equal. Color shall be as selected by the Architect from manufacturer's standard colors.

Masonry to masonry, precast to masonry and E.I.F.S. to masonry: MasterSeal NP 2 as manufactured by BASF, Shakope, MN or approved equal. Color shall be as selected by the Architect from manufacturer's standard colors.

2.2 EXTERIOR HORIZONTAL APPLICATIONS

2.2.1 MasterSeal SL 2 as manufactured by BASF, Shakope, MN or approved equal. Color shall be as selected by the Architect from manufacturer's standard colors.

2.3 INTERIOR VERTICAL APPLICATIONS

2.3.1 MasterSeal NP 1 as manufactured by BASF, Shakope, MN or approved equal. Color shall be as selected by the Architect from manufacturer's standard colors.

2.4 INTERIOR HORIZONTAL APPLICATIONS

2.4.1 At all interior floor joints MasterSeal SL1 as manufactured by BASF, Shakope, MN or approved equal. Color shall be as selected by the Architect from manufacturer's standard colors.

2.5 JOINT BACKING

Furnish " Backer-Rod" by BASF Products or approved equal.

2.6 OTHER MATERIALS

All other materials, not specifically described but required for complete and proper caulking and installation of sealants, shall be first quality of their respective kinds, new, and as selected by the Contractor subject to the approval of the Architect.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 PREPARATION

3.2.1 Steel surfaces:

3.2.1.1 Steel surfaces in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish, the metal shall be scraped or wire-brushed to remove mill scale.

3.2.1.2 Use solvent to remove oil and grease, wiping the surfaces with clean rags.

3.2.1.3 Remove protective coatings on steel by sandblasting or by a solvent that leaves no residue.

3.3 INSTALLATION OF BACKUP MATERIAL

Use only the backup material recommended by the manufacturer of the sealant and approved by the Architect for the particular installation, compressing the backup material 25% to 50% to secure a positive and secure fit. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.

3.4 PRIMING

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

3.5 BOND-BREAKER INSTALLATION

Install 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.

3.6 INSTALLATION OF SEALANTS

3.6.1 General: Prior to start of installation in each joint, verify the joint type according to the details in the Drawings, and verify that the required proportion of width of joint to depth of joint has been secured.

3.6.2 Equipment: Apply sealant under pressure with hand or power-actuated gun or other appropriate means. Guns shall have nozzle of proper size and shall provide sufficient pressure to completely fill joints as designed.

3.6.3 Masking: Thoroughly and completely mask all joints where the appearance of sealant on adjacent surfaces would be objectionable.

3.6.4 Installation of sealant: Install the sealant in strict accordance with the manufacturer's recommendations as approved by the Architect, thoroughly filling all joints to the recommended depth.

3.6.5 Tooling: Tool all joints to the profile shown on the Details in the Drawings.

3.6.6 Cleaning up:

3.6.6.1 Remove masking tape immediately after joints have been tooled.

3.6.6.2 Clean adjacent surfaces free from sealant as the installation progresses. Use solvent or cleaning agent as recommended by the sealant manufacturer.

END OF SECTION

METAL DOORS AND FRAMES

PART ONE - GENERAL

1.1 DESCRIPTION

1.1 Work included: Provide all standard and non-standard steel doors and steel door and window frames, complete in place, not specifically described in other Sections of these Specifications but indicated on the Drawings or otherwise required for a complete and operable facility.

1.1.2 Related work described elsewhere:

- | | | |
|----|---------------|------------------|
| 1. | Wood Doors | Section 08 14 29 |
| 2. | Door Hardware | Section 08 71 00 |
| 3. | Glazing | Section 08 80 00 |
| 4. | Painting | Section 09 91 00 |

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.2.3 Single source: All work of this Section shall be produced by a single manufacturer unless otherwise approved by the Architect.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Manufacturer's data: Within 30 calendar days after award of the Contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. Shop Drawings showing details of each frame type, elevations of each door design type, details of all openings, and all details of construction, installation, and anchorage.
4. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 STEEL DOORS (NON-LABELED)

Steel doors to be manufactured by Curries Manufacturing, Inc., Mason City, Iowa, or approved equal.

2.1.1 Model: Curries 707 Series Doors. Core materials for doors to be expanded polystyrene for insulated doors, permanently bonded to the inside of each face sheet.

2.1.2 Facesheets: Full flush 18 gauge cold rolled steel, stretcher-levelled quality of flatness.

2.1.3 Vertical edges of doors to have an exposed center seam.

2.1.4 Hinge and lock rail reinforcements: Hinge and lock rail shall be reinforced with a one piece full height 14 gauge channel. Both hinge and lock channels to be welded to each face sheet of the door.

2.1.5 Doors shall have a beveled (1/8" in 2") lock edge and square hinge edge.

2.1.6 Finish to be phosphatized inside and out and factory coat of prime paint.

2.1.7 Top and bottom channels: 16 gauge top and bottom channels welded to door skins at 4" centers.

2.1.8 Closer reinforcement: Box type factory installed, 14 gauge.

2.1.9 Other reinforcement: All hardware shall have factory installed reinforcement as required for hardware specified and as approved by the Architect.

2.1.10 Glazing system: GBST steel in factory primed finish.

2.1.11 Channel fillers: Screw applied steel tap cap in toilet stall and exterior doors only.

2.1.12 Astragal: Overlapping, 14 gauge material.

2.2 STEEL FRAMES

Steel frames to be as manufactured by Curries Manufacturing, Inc., Mason City, Iowa, or approved equal.

2.2.1 Construction: 16 gauge in frame depths as detailed. Frames to be mitered, face welded and ground smooth. Plaster guards to be provided at all hinge and strike locations.

2.2.2 Hinge reinforcement: 7 gauge with a minimum of 4 projection welds per reinforcement.

- 2.2.3 Strike reinforcement: 14 gauge with tubulated screw holes.
- 2.2.4 Surface mounted hardware reinforcement: Min. 14 gauge.
- 2.2.5 Frame to be prepared for 4-1/2" x 4-1/2" standard weight or heavy weight hinges and strike plate as required for hardware specified.
- 2.2.6 Anchors: Masonry or stud anchors at max. 24 inches o.c., suitable to specified wall conditions and as approved by the Architect.
- 2.2.7 Silencers: Three per strike jamb and two per head on double swing frames. Punch frames to receive silencers.
- 2.2.8 Finish: Factory installed one coat of rust inhibitive primer.

2.3 FIRE RATED DOOR ASSEMBLIES

- 2.3.1 All labeled fire door assemblies to be of a type which have been classified and listed in accordance with the latest edition of NFPA80 and tested in compliance with NFPA-252, UL-10B, and UBC-7-2. A physical label to be affixed to the fire door at an authorized facility. Embossed labels are acceptable on standard three sided door frames.
- 2.3.2 For openings required to be fire rated exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

2.4 FABRICATION

2.4.1 General:

- 2.4.1.1 Fabricate steel door and frame units to rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles.
- 2.4.1.2 Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at the site.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 INSTALLATION

- 3.2.1 General: Install hollow metal units and accessories in accordance with manufacturer's data, and as specified herein.

3.2.2 Placing frames:

3.2.2.1 Comply with the provisions of Standard 100 of the Steel Door Institute, unless otherwise indicated.

3.2.2.2 Except for frames located at in-place concrete or masonry openings, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

3.2.2.3 In masonry construction, locate wall anchors at 24" o.c. at hinge and strike levels. Building-in of anchors and grouting of frames will be performed under provisions of Division 4 of these Specifications.

3.2.2.4 At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices. If attached with screws, provide "Z" fillers at each screw location to prevent collapse or distortion of frame when screws are tightened.

3.2.2.5 When installed in prepared openings in concrete or masonry construction, install sealant between frame and concrete or masonry in compliance with the requirements of Section 07 92 00.

3.2.2.6 Place 5/8" glazing stops where required and screw at 12" o.c. maximum.

3.2.3 Door installation:

3.2.3.1 Fit doors accurately in their respective frames, within clearances specified in S.D.I. 100.

3.3 ADJUST AND CLEAN

3.3.1 Final adjustments: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.

3.3.2 Prime coat touch-up: Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

END OF SECTION

WOOD DOORS

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Work included: Furnish and deliver to the job site all wood doors, factory prefinished, indicated on the Drawings, specified herein, or needed for a complete and proper installation.
- B. Related work described elsewhere:
- | | | |
|----|-----------------------|------------------|
| 1. | Installing Wood Doors | Section 06 20 00 |
| 2. | Standard Steel Frames | Section 08 11 00 |
| 3. | Door Hardware | Section 08 71 00 |
| 4. | Glazing | Section 08 80 00 |

1.2 QUALITY ASSURANCE

- A. Qualifications of manufacture: All wood doors shall meet the requirements of the industry standard WDMA I.S.1-A or AWS classifications. Fire doors shall also bear the UL label for the designated rating.

1.3 SUBMITTALS

- A. General: Comply with the provisions of Section 01 33 23.
- B. Product data: Within 30 calendar days after award of Contract, submit:
1. Complete materials list showing all items proposed to be furnished and delivered under this Section.
 2. Sufficient data to demonstrate that all such items meet or exceed the specified requirements.
 3. A copy of the guarantee proposed to be furnished.

1.4 WARRANTY

- A. Upon delivery of the doors of this Section to the job site, and as a condition of their acceptance, deliver to the Architect two copies of an agreement written on the door manufacturer's standard form, signed by the door manufacturer and the Contractor agreeing to replace or repair defective doors which have warped (bow, cup, or twist) or which show photographing of construction below in wood veneer faces, as defined in WDMA Standard Door Warranty, except the WDMA provision for refunding the price received by the door manufacturer for any defective door shall not apply. The warranty shall also include refinishing and reinstalling which may be required due to repair or replacement of defective doors. Warranty shall be in effect for the lifetime of the building.

1.5 PRODUCT HANDLING

A. Protection:

1. Protect the materials of this Section during transit, storage, and handling to prevent deterioration, damage, and soiling.
2. Package each door at the factory in a separate heavy paper-type carton. Mark each carton for location to correspond with opening number on the Drawings.
3. Replacements: In the event of damage, immediately make all repairs and replacements necessary to approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 GENERAL

- A. Manufacturer: All doors are to be manufactured by Graham Wood Doors, Mason City, Iowa or approved equal. Size and thickness as shown on the Drawings.
- B. Face: Premium grade, rotary cut, select white birch with matching veneers on all vertical stiles. 1/50" veneer thickness, grade A veneer. All doors shall be factory prefinished. Finish shall be as selected by the Architect from the manufacturers standard finishes.
- C. Rails: 1-1/8" minimum top and bottom rails. 1-3/8" minimum hinge and lock stiles. Stiles and rails shall be laminated strand lumber. Stiles are to have a minimum 1/4" solid edge to match face veneer. Tape veneer not allowed.
- D. Fixed Panels: All transom and plenum panels shall have continuous matched grain with the operating door veneer.
- E. Standards: Doors to meet or exceed WDMA Industry Standard I.S. 1-A Series Type P.C. for non-fire rated doors, Type FD 1-1/2, 1, or 3/4 for fire rated doors, and type SR for sound rated doors.

2.2 NON-FIRE RATED WOOD DOORS

- A. PC5 Particleboard Core. Core shall be fully bonded. Drop-in cores not allowed.

2.3 FIRE RATED DOORS (IF REQUIRED)

- A. Mineral Core FD-90, FD-60, and FD-45 as required. Refer to door schedule for exact types required. All fire doors to meet the requirements of the current building code. Provide concealed intumescent as standard on mineral core doors.

2.4 GLAZED OPENINGS

- A. Metal stops and frames shall be factory primed and removable for painting (according to Section 09 91 00 - Painting) and installation of glazing by glazing contractor.

2.5 BLOCKING

A. Non-Rated and 20 Minute Doors:

1. Provide 5" top-rail blocking at doors indicated to have closers.
2. Provide 5" mid-rail blocking at doors indicated to have exit devices.

B. Fire Rated Doors over 20 Minutes:

1. For mineral core doors, provide composite blocking with improved screw holding capability approved for use in doors of fire ratings indicated as necessary to eliminate need for through-bolting hardware and as follows:
 - a. Provide 5" top rail blocking.
 - b. Provide 5" bottom rail blocking at doors indicated to have kick, mop, or armor plates.
 - c. Provide 4 1/2" x 10" lock blocks.
 - d. Provide 5" mid-rail blocking, at doors indicated to have exit devices.

2.6 FABRICATION

A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements of NFPA 80 for fire rated doors.

B. Factory machine doors for hardware that is not surface applied. Comply with the final hardware schedules, door frame shop drawings, DHI A115-W series standards and hardware templates.

1. Coordinate locations with metal frames.
2. Machine metal astragals for hardware, sized to openings.

PART THREE - EXECUTION

3.1 DELIVERY

A. Deliver the work of this Section to the job site in a timely manner to permit orderly progress of the total Work.

3.2 INSTALLATION

A. Installation of the Work of this Section is described in Section 06 20 00.

END OF SECTION

OVERHEAD COILING DOORS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide overhead coiling doors complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Manufacturer's data: Within 30 calendar days after award of the Contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. Shop Drawings showing precise dimensions of the work of this Section, and all other data needed to ensure proper and adequate provision to accommodate the work of this Section.
4. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.4.3 Delivery and storage: Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 OVERHEAD COILING DOOR

Furnish and install overhead coiling doors as manufactured by Overhead Door Corporation, Dallas, Texas.

2.1.1 Series 625 (Insulated): Door section shall be interlocking roll-formed galvanized steel, 20 gauge, flat profile type F-2651 slats. Weather seals bottom, exterior guide, and interior hood. Finish to be baked on polyester (powder coated) top coat. Color selected by Architect from manufacturer's full range of RAL colors. Provide standard locks, interior and exterior where shown on drawings. Provide for all mounting requirements of horizontal track to structure.

2.1.2 Operation: Motor operation – both interior and exterior operators. Refer to electrical drawings.

2.2 OTHER MATERIALS

All other materials, including but not necessarily limited to anchorage devices for the work of this Section, shall be only as recommended by the manufacturer and as approved by the Architect.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 COORDINATION

Use all means necessary to coordinate with other trades and to ensure that proper and adequate provision is made in the work of other Sections to accommodate installation of the work of this Section.

3.3 INSTALLATION

Install the work of this Section in strict accordance with the recommendations of the manufacturers as approved by the Architect, anchoring all components firmly into position for long life under hard use.

END OF SECTION

SECTIONAL DOORS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide overhead sectional doors, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Manufacturer's data: Within 30 calendar days after award of the Contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. Shop Drawings showing precise dimensions of the work of this Section, and all other data needed to ensure proper and adequate provision to accommodate the work of this Section.
4. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.4.3 Delivery and storage: Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

- A. Glazed Sectional Overhead Doors: 521 Series Aluminum Doors by Overhead Door Corporation or Architect approved equal.
1. Door Assembly: Stile and rail assembly secured with 1/4 inch diameter through rods.
 - a. Panel Thickness: 1-3/4 inches.
 - b. Center Stile Width: 2-11/16 inches.
 - c. End Stile Width: 3-5/16 inches.
 - d. Intermediate Rail Pair Width: 3-11/16 inches.
 - e. Top Rail Width:
 - 1) 2-3/8 inches
 - f. Bottom Rail Width:
 - 1) 3-3/4 inches
 - g. Aluminum Panels: 0.050 inch thick, aluminum.
 - h. Stiles and Rails: 6063 - T6 aluminum.
 - i. Springs:
 - 1) 75,000 cycles.
 - j. Glazing:
 - 1) 1/2" Insulated Glass.
 2. Finish and Color:
 - a. Powder Coating Finish: Color as selected by Architect from manufacturer's standard colors.
 3. Windload Design: Provide to meet the Design/Performance requirements specified.
 4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
 5. Lock: Interior galvanized single unit.
 6. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
 7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
 8. 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) Electric sensing edge monitored to meet UL 325/2010.
 - b. Operator Controls (Interior and Exterior Operators):
 - 1) Push-button operated control stations with open, close, and stop buttons.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 COORDINATION

Use all means necessary to coordinate with other trades and to ensure that proper and adequate provision is made in the work of other Sections to accommodate installation of the work of this Section.

3.3 INSTALLATION

Install the work of this Section in strict accordance with the recommendations of the manufacturers as approved by the Architect, anchoring all components firmly into position for long life under hard use.

END OF SECTION

ENTRANCES AND STOREFRONT

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all aluminum entrances and storefront complete, in place, as indicated on the Drawings, specified herein, or otherwise needed for a complete and proper installation of the Work of this Section.

1.1.2 Related work described elsewhere:

- | | | |
|----|----------------|------------------|
| 1. | Joint Sealants | Section 07 92 00 |
| 2. | Glazing | Section 08 80 00 |

1.1.3 This specification is written using Kawneer Co., Inc. products. Acceptable manufacturers (following Kawneer Co., Inc. specifications for manufacturing):

1. Tubelite, Walker, MI
2. Oldcastle, Atlanta, GA
3. EFCO, Monett, MO
4. Manko, Manhattan, KS
5. YKK

1.2 QUALITY ASSURANCE

1.2.1 Qualification of manufacturer: Use products in the work of this Section produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of installers: Use skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.2.3 Source Limitations: Obtain aluminum framed storefront and doors through one source from a single manufacturer.

1.3 SUBMITTALS

1.3.1 General: Comply with the requirements of Section 01 33 23.

1.3.2 Prompt data: No later than 30 calendar days after award of the contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Sufficient data to demonstrate compliance with all specified requirements.
3. Shop Drawings of the entire installation.
4. Samples of the specified finish.

5. Manufacturer's recommended methods of installation which, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the job.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO – PRODUCTS

2.1 ENTRANCE UNIT

Series 500 (wide stile):

2.1.1 Materials: Extrusions shall be 6063-T6 alloy and temper (ASTM B 221 alloy G.S. 10A-T5). Fasteners, where exposed, shall be aluminum, stainless steel or plated steel in accordance with ASTM A 164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum. Glazing gaskets shall be EPDM elastomeric extrusions. Major portions of the door stiles shall be .125" (3.2) in thickness and glazing molding shall be .050" (1.2) thick.

2.1.2 Finish: All exposed framing surfaces shall be free of scratches and other serious blemishes using a multi-stage cleaning process to remove organic and inorganic surface soils and residual oxides. The cleaned and treated substrate shall be primed with Fluroprime to a thickness of .2 - .4 mils using Valspar approved factory application methods. The Fluropon paint system shall be factory applied and oven baked.

2.1.3 Hardware: Refer to Section 08 71 00 – Door Hardware.

2.1.4 Fabrication: The door stile and rail face dimensions of the 500 entrance door will be as follows:

DOOR	VERTICAL STILE	TOP RAIL	BOTTOM RAIL
500	5 - 1/32"	5 - 1/32"	10"

Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds. Glazing stops shall be snap-in type with EPDM glazing gaskets.

The door weathering on the single acting offset pivot shall be Kawneer Sealair weathering. The door bottom rail will be weathered with an EPDM blade gasket sweep strip applied with concealed fasteners.

2.2 STOREFRONT

Series Tri-fab 451T (2" x 4 1/2") with center set glazing:

2.2.1 Materials: Extrusions shall be 6063-T6 alloy and temper (ASTM B221 alloy G.S. 10A-T5). Fasteners, where exposed, shall be aluminum, stainless steel or zinc plate steel in accordance with ASTM A164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum. Glazing gaskets shall be EPDM elastomeric extrusions. Single acting entrance frame weathering shall be a non-porous, polymeric material.

2.2.2 Finish: All exposed framing surfaces shall be free of scratches and other serious blemishes using a multi-stage cleaning process to remove organic and inorganic surface soils and residual oxides. The cleaned and treated substrate shall be primed with Fluroprime to a thickness of .2 - .4 mils using Valspar approved factory application methods. The Fluropon paint system shall be factory applied and oven baked.

2.2.3 Fabrication: The framing system shall provide for flush glazing on all sides with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension of 1-3/4" (44.5 mm). Overall depth shall be 4" (101.6 mm). All exterior face members will be seamless. Entrance framing members shall be compatible with glass framing in appearance and single acting entrance frames shall include the Sealair positive barrier weathering.

PART THREE - EXECUTION

3.1 ENTRANCE UNIT

3.1.1 Installation: All jambs, head and sill track shall be set in correct locations as shown in the details and shall be level, square, plumb and in alignment with other work in accordance with the manufacturer's installation instructions and approved shop drawings. All joints between framing and the building structure shall be sealed in order to secure a watertight installation.

3.1.2 Protection and cleaning: After installation, the General Contractor shall adequately protect exposed portions of aluminum surfaces from damage by grinding and polishing compounds, plaster, lime, acid, cement, or other contaminants. The General Contractor shall be responsible for final cleaning.

3.2 STORE FRONT

3.2.1 Installation: All glass framing shall be set in correct locations as shown in the details and shall be level, square, plumb and in alignment with other work in accordance with the manufacturer's installation instructions and approved shop drawings. All joints between framing and the building structure shall be sealed in order to secure a watertight installation.

3.2.2 Protection and cleaning: After installation, the General Contractor shall adequately protect exposed portions of aluminum surfaces from damage by grinding and polishing compounds, plaster, lime, acid, cement, or other contaminates. The General Contractor shall be responsible for final cleaning.

END OF SECTION

DOOR HARDWARE

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Furnish and deliver to the job site all finish hardware required to complete the Work as indicated on the Drawings and specified herein. Provide all trim attachments, and fastenings specified or required for proper complete installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Fire rated openings: Comply with the requirements of Underwriters' Laboratories, Inc.

1.2.3 Supplier Qualifications: A recognized architectural door finish hardware supplier, with warehouse facilities in the project's vicinity and that employs an Architectural Hardware Consultant (AHC).

1.3 SUBMITTALS

1.3.1 General: Comply with the provisions of Section 01 33 23.

1.3.2 Product data: If proposed products are other than as specified, within 35 calendar days after award of the Contract, submit:

- A. Complete materials list of all items proposed to be furnished and delivered under this Section.
 - 1. Identify each hardware item by manufacturer, the manufacturer's catalog number, and the location of the item in the Work.
 - 2. Submit a detailed, vertical type hardware schedule conforming to DHI format organized into "hardware sets".
- B. Manufacturer's specifications, catalog cuts, and other data required to demonstrate compliance with specified hardware.

Approval of the hardware list by the Architect shall not relieve the Contractor from the responsibility for furnishing all required finish hardware.

1.3.3 Templates: In a timely manner to ensure orderly progress of the Work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.4 PRODUCT HANDLING

1.4.1 Packing and marking: Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate the contents and specific location in the Work.

1.4.2 Protection: Use all means necessary to protect materials of this Section before, during and after delivery to the job site and to protect the Work and materials of all other trades.

1.4.3 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 SUBSTITUTIONS

2.1.1 Hinges: Ives, McKinney or equal.

2.1.2 Locksets: Best 9K No Substitute

2.1.3 Exit Devices: Von Duprin 99/33 series or Sargent 19-43-GL-80 series.

2.1.4 Closers: LCN 4040XP Exterior/1460 Interior, Corbin Ruswin DC8000 Exterior/DC6000 interior

2.1.5 Flat Goods: Ives, Rockwood

2.1.6 Threshold and Weatherstrip: Zero, National Guard, Pemko

2.1.7 Fasteners:

2.1.7.1 Furnish all finish hardware with all necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.

2.1.7.2 Furnish fastenings where necessary with expansion shields, toggle bolts, hex bolts, and other anchors approved by the Architect, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.

2.1.7.3 All fastenings shall harmonize with the hardware as to material and finish.

2.1.8 Finishes of all hardware shall match the finish of the locksets. Take special care to coordinate all the various manufactured items furnished under this Section, to ensure acceptably uniform finish.

2.2 MISCELLANEOUS

2.2.1 All hardware meets criteria for Handicap Accessibility Requirements of ADA.

2.2.2 All other items, not specifically described but required for a complete and proper installation of finish hardware, shall be as selected by the Contractor subject to the approval of the Architect.

2.3 KEYING

All locksets shall be keyed to the existing Best Grand Master Key System. All locksets shall be keyed alike in groups or keyed different as directed. Furnish four keys for each keyed alike set and two keys for each keyed different lockset. Stamp key bows with key set symbol.

It will be the responsibility of the hardware supplier to call or meet with the Owner to obtain keying requirements for this project.

2.4 MANUFACTURERS INDEX

BES – Best	IVE – Ives
LCN – LCN	SCH– Schlage
VON - Von Duprin	ZER - Zero

2.5 HARDWARE GROUPS

The following is a general listing of the minimum hardware requirements. Any item of hardware normally required by good practice as to meet state or local codes shall be furnished even though it may not be specifically mentioned.

HW- 001 Each SGL door to have:

- ALL HARDWARE BY OVERHEAD DOOR MANUFACTURER.
- COORDINATE ANY CYLINDER REQUIREMENTS WITH OVERHEAD DOOR SUPPLIER.

HW- 103 Each SGL door to have:

3	HINGE	5BB1 4.5 X 4.5	652	IVE
1	ENTRANCE LOCK	9K3-7AB-15D-S3	626	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
1	WALL STOP	WS406/407CCV	630	IVE

HW- 201C Each SGL door to have:

3	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	STOREROOM LOCK	9K3-7D-15D-S3	626	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
1	SURFACE CLOSER	1461 SCUSH	689	LCN
3	SILENCER	SR64	GRY	IVE

HW- 210S Each PR door to have:

6	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	CONST LATCHING BOLT	FB51P	630	IVE
1	DUST PROOF STRIKE	DP2	626	IVE
1	STOREROOM LOCK	9K3-7D-15D-S3	626	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
1	OH STOP	90S X SIZE AS REQ (INACTIVE)	630	GLY
1	SURFACE CLOSER	1461 SCUSH (ACTIVE)	689	LCN
2	SILENCER	SR64	GRY	IVE

HW- 341 Each SGL door to have:

3	HINGE	5BB1 4.5 X 4.5	652	IVE
1	PRIVACY LOCK W/ OUTSIDE INDICATOR	ND40S RHO OS-LOC	626	SCH
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
1	SURFACE CLOSER	1461 REG STD	689	LCN
3	SILENCER	SR64	GRY	IVE

HW- 701A Each SGL door to have:

1	CONT. HINGE	112XY	313AN	IVE
1	PANIC HARDWARE	99-L-06	313	VON
1	RIM CYLINDER	1E-72	613	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	605	BES
1	SURFACE CLOSER	1461 SCUSH STD	695	LCN
1	PA MOUNTING PLATE	1460-18PA	695	LCN
1	CUSH SHOE SUPPORT	1460-30	695	LCN
1	BLADE STOP SPACER	1460-61	695	LCN

HW- 701C Each SGL door to have:

3	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	PANIC HARDWARE	99-L-06	626	VON
1	RIM CYLINDER	1E-72	626	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
1	SURFACE CLOSER	1461 SHCUSH	689	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	SILENCER	SR64	GRY	IVE

HW- 710A Each PR door to have:

2	CONT. HINGE	112XY	313AN	IVE
2	PANIC HARDWARE	9947-L-LBR-06	313	VON
2	RIM CYLINDER	1E-72	613	BES
2	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	605	BES
2	SURFACE CLOSER	1461 SCUSH STD	695	LCN
2	PA MOUNTING PLATE	1460-18PA	695	LCN
2	CUSH SHOE SUPPORT	1460-30	695	LCN
2	BLADE STOP SPACER	1460-61	695	LCN

HW- 714 Each PR door to have:

2	CONT. HINGE	114XY	628	IVE
1	PANIC HARDWARE	9947-DT	626	VON
1	PANIC HARDWARE	9847-NL	626	VON
1	RIM CYLINDER	1E-72	626	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
2	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	SEAL	PERIMETER SEAL BY FRAME MFR		
1	ASTRAGAL	MEETING STILE SEAL BY DOOR MFR		
2	DOOR SWEEP	39A	A	ZER
2	MEETING STILE	8194AA LENGTH AS REQ (2 PCS/1 SET)	AA	ZER
1	THRESHOLD	655A	A	ZER

HW- 715 Each SGL door to have:

1	CONT. HINGE	114XY	628	IVE
1	PANIC HARDWARE	99-NL	626	VON
1	RIM CYLINDER	1E-72	626	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	626	BES
1	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	GASKETING	188S (HEAD & JAMBS)	BK	ZER
1	DOOR SWEEP	39A	A	ZER
1	THRESHOLD	655A	A	ZER

HW- 715A Each SGL door to have:

1	CONT. HINGE	112XY	313AN	IVE
1	PANIC HARDWARE	99-NL	313	VON
1	RIM CYLINDER	1E-72	613	BES
1	PERMANENT CORE	MATCH EXISTING KEY SYSTEM	605	BES
1	SURFACE CLOSER	4040XP SCUSH	695	LCN
1	PA MOUNTING PLATE	4040XP-18PA	695	LCN
1	CUSH SHOE SUPPORT	4040XP-30	695	LCN
1	BLADE STOP SPACER	4040XP-61	695	LCN
1	SEAL	PERIMETER SEAL BY FRAME MFR		
1	ASTRAGAL	MEETING STILE SEAL BY DOOR MFR		
1	DOOR SWEEP	39A	A	ZER
1	THRESHOLD	655A	A	ZER

HW- 801 Each SGL door to have:

3	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	PUSH PLATE	8200 4" X 16"	630	IVE
1	PULL PLATE	8303 10" 4" X 16" F	630	IVE
1	SURFACE CLOSER	1461 REG STD	689	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	WALL STOP	WS406/407CCV	630	IVE
3	SILENCER	SR64	GRY	IVE

HW- D800 Each PR door to have:

2	PIVOT SET	7255 SET	626	IVE
4	PUSH PLATE	8200 4" X 16"	630	IVE
2	CONCEALED CLOSER	6031 BUMP WMS	689	LCN
4	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	WALL STOP	WS406/407CCV	630	IVE

-DOUBLE ACTING DOOR

END OF SECTION

GLAZING

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all glass and glazing, complete, in place, as shown on the drawings, specified herein, or needed for a complete and proper installation.

1.1.2 Related work described elsewhere:

- | | | |
|----|--------------------------|------------------|
| 1. | Metal Doors and Frames | Section 08 11 00 |
| 2. | Entrances and Storefront | Section 08 41 00 |

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with the provisions of Section 01 33 23.

1.3.2 Product data: Within 30 calendar days after award of the Contract, submit:

1. Complete materials list showing all items proposed to be furnished and installed under this Section.
2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 GLASS

2.1.1 General: The type of glass is called for on details and schedules in the drawings. The "Types" as defined below.

2.1.2 Glass types:

1. 1/4" tempered glass shall be Herculite Tempered Glass, clear glass with tong edges by Vitro Architectural Glass (formerly PPG Glass) or approved equal. Laminated glass is not acceptable.
2. 1" Solar Control Low-E Tinted Insulating Glass as manufactured by Vitro Architectural Glass (formerly PPG Glass) 1/4" glass, 1/2" air space and 1/4" glass. Outdoor lite: Standard tint as selected by Architect from manufacturers three (3) standard colors. Indoor lite: Clear float glass, sputter coated on third surface (3). Low-E coating: "Solarban" 70 solar control (sputtered). Use heat strengthened glass as required by the manufacturer. All glass tempered safety where required by code.

2.1.3 Other materials:

1. Sealant: G.E. Silglaze and Silglaze Tape by General Electric Company, or approved equal.
2. Glazing materials and accessories: As recommended by the glass and frame manufacturers as needed to provide a complete installation.

PART THREE - EXECUTION

3.1 PREPARATION

1. Examine the areas and conditions under which the Work of this Section will be installed.
2. Correct conditions detrimental to the proper and timely completion of the Work.
3. Do not proceed until unsatisfactory conditions have been corrected.
4. Verify that all glass locations and types comply with all applicable codes.
5. Surfaces shall be dry and free from dust or ice. Dirty surfaces shall be cleaned with a cloth saturated with turpentine or mineral spirits before glazing. Remove loose dirt particles and mortar from recesses prior to installation of glass and glazing materials.

3.2 INSTALLATION

1. General: Install the glass in accordance with the Drawings and the approved guidelines of the glass manufacturer for each type of installation except that glazing tape or putty must be installed on both faces of all glazing, no exceptions.
2. Glaze hollow metal frames in conformance with the details and general conditions governing glazing in Flat Glass Marketing Association's (FGMA) Glazing Manual.
3. Glaze doors in conformance with the appropriate glazing methods described in the standards under which they are produced.
4. The Contractor shall set all glass in the best possible manner and in such a way that there will be an equal bearing to entire width of each panel. The Contractor will be held responsible for broken glass due to improper setting. Setting, generally, will be with glazing stops, furnished by the door or fixed framing manufacturer, or by the millwork subcontractor.
5. All glass shall be accurately set to fit the frame, and all edges shall be smooth, no sharp or ragged edges being left.

3.3 MANUFACTURER'S LABELS

Labels showing strength, grade, thickness, type and quality will be required on each piece of glass. Labels shall remain on glass until it has been set and inspected. When glass is not cut to size by the manufacturer and is furnished unlabeled from local stock, the contractor shall submit an affidavit stating the quality, thickness, type and manufacturer of the glass furnished.

3.4 CLEANING

1. After installation, mark glass by placing tape or ribbon across the glass between the mullions, avoiding sticking anything to the glass surface, if possible.
2. Just before final inspection, thoroughly clean all glass and remove all labels, paint spots, putty, and other defacements. Do not use acid solutions or water containing caustic soaps. Broken or cracked glass not complying with these specifications will be replaced. At completion of work, glass and other glazing materials shall be clean, whole and in perfect condition.

3.5 MEASURING AND SIZES

All sizes for glass shall be taken from the actual frames, doors and sash. This contract contemplates all glass to be set in place, and this contractor shall assume all responsibility in regard to correct sizes. Size marked on the drawings are approximate and shall be used for estimating only.

END OF SECTION

GYPSUM BOARD ASSEMBLIES

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all gypsum drywall, gypsum ceiling, gypsum furr downs, metal studs, and accessories, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable by the Architect.

1.2.2 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Manufacturer's data: Within 30 calendar days after award of the Contract, submit:

- A. Complete materials list of all items proposed to be furnished and installed under this Section.
- B. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
- C. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.4.3 Delivery and storage: Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 GENERAL

All products, unless noted otherwise, are as manufactured by ClarkDietrich Building Systems Industries, Inc., Pittsburg, PA or approved equal.

2.1.1 Steel framed drywall system (ceilings and walls):

- A. Metal studs, runners, and channels:
 - 1. All members shall be a minimum of 20 ga. unless noted otherwise on drawings.
 - 2. All interior metal stud framing (gauges and depth of frame) shall comply with manufacturer's recommended sizing properties.
- B. 8 ga. galvanized hanger wire.
- C. 18 ga. galvanized tie wire.
- D. Faceboards:
 - 1. 5/8" thick Fire Code "Type X" Gypsum Panels (Provide 5/8" thick Dens-Shield tile backer board at all ceramic tile locations, 5/8" thick MR board at all other wet locations, except use 1/2" Dens-Shield on partitions between water closets).
 - 2. 1/2" DensGlass Gold Exterior Guard on exterior face of all outside walls.
 - 3. 5/8" Fiberock wall board panels (fire resistant) by US Gyp. (where noted on drawings).
 - 4. High Impact Gyp: USG sheetrock brand Mold Tough VHI Firecode X Core Panels.
- E. Shaftliner: 1" DensGlass Ultra shaftliner where shown on drawings.
- F. Fasteners: As recommended by ClarkDietrich Building Systems.
- G. Trim No. 200-A.
- H. Corner bead No. 104 Dur-A-Bead.
- I. Control joint No. 093

PART THREE - EXECUTION

3.1 PARTITION INSTALLATION

3.1.1 Stud system erection: Attach steel runners at floor and ceiling to structural elements with suitable fasteners located 2" from each end and spaced 24" o.c. or to suspended ceilings with toggle bolts or hollow wall anchors spaced 16" o.c.

Position studs vertically, with open side facing in same direction, engaging floor and ceiling runners, and spaced 1'4" o.c. when necessary, splice studs with 8" nested lap and two positive attachments per stud flange. Place studs in direct contact with all door frame jambs, abutting partitions, partition corners and existing construction elements. Where studs are installed directly against exterior walls and a possibility of water penetration through walls exists, install asphalt felt strips between studs and wall surfaces.

Anchor all studs for shelf-walls and those adjacent to door and window frames, partition intersections, corners and free-standing furring to ceiling and floor runner flanges with USG Metal Lock Fastener tool or screws. Securely anchor studs to jamb and head anchor clips of door or borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flange bend at each end, and secure to strut-studs with two screws in each bent web. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over door frame header.

Install horizontal bridging of 54 mil. "U" channel in stud system, spaced at not more than 4'-0" o.c. vertically.

3.1.2 Gypsum panel erection: For walls 12'-0" tall or less, apply gypsum panels parallel to studs (vertically). Position edges over studs for attachment. Use maximum practical lengths to eliminate end joints. Fit edges closely, but not forced together. Stagger joints on opposite sides of partitions.

For walls over 12'-0" tall, apply gypsum panels perpendicular to studs. Position ends over studs for perpendicular application. Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together. Stagger joints on opposite sides of partition.

For single-layer parallel application of gypsum panels, space screws 12" o.c. in field of panels and along vertical abutting edges. For perpendicular panel application, space screws 16" o.c. in field and 8" o.c. staggered along abutting end joints.

For double-layer screw attachment, space screws 24" o.c. in base layer and 8" o.c. at edges and 12" o.c. in field in face layer. Apply both layers of gypsum panels vertically with joints in face layer offset from base layer joints. For 1/2" and 5/8" panels, use 1" screws for base layer and 1-5/8" screws for face layer.

3.3 CEILING INSTALLATION

3.3.1 Grillage erection: Space 8-ga. hanger wires 48" o.c. along carrying channels and within 6" of ends of carrying-channel run. In concrete, anchor within 6" of ends of carrying-channel run. In concrete, anchor hangers by attachment to reinforcing steel, by loops embedded at least 2" or by approved inserts. For steel construction, wrap hanger around or through beams or joists.

Install 1-1/2" carrying channels 48" o.c. and within 6" of walls. Position channels for proper ceiling height, level, and secure with hanger wire saddle-tied along channel. Provide 1" clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12" and secure each end with double-strand 18-ga. wire.

Erect metal furring channels at right angles to 1-1/2" carrying channels or main supports. Space furring (16") o.c. and within 6" of walls. Provide 1" clearance between furring ends and abutting walls and partitions. Secure furring to carrying channels with clips or wire-tie to supports with double-strand 18-ga. wire. At splices, nest furring channels at least 8" and securely wire-tie each end with double-strand 18-ga. wire.

At light troffers or any openings that interrupt the carrying or furring channels, install additional cross reinforcing to restore lateral stability of grillage.

3.5 ACCESSORY APPLICATION

- A. Joint system: Finishing of all face panel joints and internal angles by painting contractor.
- B. Laminating adhesive: Spread to provide 1/2" adhesive beads 4-1/2" o.c. for full sheet lamination. For strip lamination, apply adhesive in vertical strips of four 1/2" beads 1-1/2" to 2" o.c. Space strips 24" o.c.
- C. Corner bead: Reinforce all vertical and horizontal exterior corners with corner bead fastened with 1-1/8" drywall screws 9" o.c. on both flanges along entire length of bead.
- D. Metal trim: Where assembly terminates against masonry or other dissimilar material, apply metal trim over panel edge and fasten with 1-1/8" drywall screws 9" o.c.
- E. P-1 vinyl trim: Slip trim over panel with long flange behind panel. Install panel with trim firmly abutting surface.
- F. Screws: Power-driven at least 3/8" from edges or ends of panel to provide uniform dimple 1/32" deep.
- G. Control joints: Break panel behind joint and back by double framing members (and 2" wide gypsum panel strip). Attach control joint to face layer with 1-1/8" drywall screws spaced 6" o.c. on both flanges along entire length of joint. Locate control joints where shown on plans or a maximum of 30 feet in continuous unbroken expanses of walls and furredowns. Locate control joints a minimum of 30' o.c. of continuous gypsum ceiling.
- H. Reveal molding: Extruded aluminum as manufactured by Fry Reglet Corp. or approved equal. Sizes as shown on drawings.
- I. Aluminum breakaway clip (AB): 2" x 2" x 2 1/2" designed to melt and break away when exposed to fire.

3.6 TEXTURE COAT

By Painting Contractor; see Section 09 91 00.

3.7 CLEANING UP

Use all necessary care during execution of this portion of the work to prevent scattering of gypsum wallboard scraps and dust and to prevent tracking of joint and finishing compound onto floor surfaces. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scraps, debris, and surplus material of this Section.

END OF SECTION

TILE

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all wall and trim shapes complete in place, as indicated on the drawings, specified herein, or otherwise needed for a complete and proper installation of the work of this Section.

1.2 QUALITY ASSURANCE

1.2.1 Standards:

1. ANSI A137.1-1988 (American National Standard Institute).
2. TCA-137.1-2000 (Tile Council of America - Recommended Standard specifications for Ceramic Tile).

1.2.2 Qualifications of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a 10-year history of successful production acceptable to the Architect.

1.2.3 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with the requirements of Section 01 33 23.

1.3.2 Product data: Within 30 calendar days after award of the Contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.2 Replacement: In the event of damage, immediately make all repairs and replacements needed to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 PORCELAIN WALL TILE

2.1.1 Porcelain - Matte

1. "Prodigy™"
2. PT-1 – 12" x 24"
3. Color and pattern to be selected by the Architect.

2.2 APPROVED TILE MANUFACTURERS

2.2.1 American Olean Tile Company, Dal-Tile by Dal-Tile Corporation and Emser Tile Company

2.3 SETTING MATERIAL

1. Dry-set mortar: ANSI A118.1-1999 or
2. Latex-Portland Cement Mortar: ANSI A118.4-1999.

2.4 GROUT

1. Prism® ultimate performance cement-based grout as manufactured by Custom Building Products or approved equal. Material shall meet ANSI A-118.6-1999. Color(s) as selected from manufacturer's stock colors by the Architect,

PART THREE - EXECUTION

3.1 PREPARATION

3.1.1 Ensure that concrete slab is well cured, dimensionally stable and free of cracks, waxy or oily films and curing compounds.

3.1.2 Ensure that concrete masonry wall has struck joints, is dimensionally stable, and is free of cracks, waxy or oily films.

3.1.3 Install elastomeric waterproofing material at all wet areas according to manufacturer's published installation instructions.

3.2 INSTALLATION

3.2.1 Completed installation shall be free of broken, damaged, or faulty tile.

3.2.2 Install all tile using leveling clips.

3.3 CAULK JOINTS

At all vertical inside corners, at all masonry control joints, and at all vertical joints where tile butts other material (such as door frames) install caulk joint (color to match grout). Refer to Section 07 92 00 for material. Where floor tile crosses floor control joints, provide caulk joint.

3.4 CLEANING

3.4.1 Upon completion of the wall tile installation, remove all unused materials rubbish, etc., in connection with this contract and give the tile work a thorough cleaning at the time of its completion. When tiles are set, sponge off grout or cement with clean water, leaving surface of tile clean. Acid will not be permitted in cleaning solutions for tile. Walls above tile shall be protected from stains or damage in the installation of tile and cleaning of tile.

END OF SECTION

ACOUSTICAL CEILINGS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Acoustical treatment required for this Work includes, but is not necessarily limited to acoustical tile ceilings.

1.1.2 Related work described elsewhere:

- | | |
|---|------------------|
| 1. Acoustical Ceiling Suspension Assemblies | Section 09 53 00 |
|---|------------------|

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with the provisions of Section 01 33 23.

1.3.2 Product data: Within 30 days after award of the Contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

1.4.1 Delivery and storage: Deliver the materials in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations as approved by the Architect.

1.4.2 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.3 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 ACOUSTICAL TILE

Provide Armstrong Dune #1774 (2' x 2') or #1776 (2' x 4') Angled Tegular Series ceiling tile as shown on drawings in accordance with specified UL design assembly, UL Classified NRC .55, minimum CAC 35. Humiguard Plus Performance with BioBlock paint on face and back of board. Ceiling tile shall be installed on Armstrong Prelude hot dipped galvanized grid providing a 30 Year systems warranty on board and grid.

2.2 OTHER MATERIALS

All other materials, not specifically described but required for a complete and proper installation of the Work of this Section, shall be as selected by the Contractor subject to the approval of the Architect.

PART THREE - EXECUTION

3.1 INSPECTION

Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

Install all materials in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components firmly into position for long life under hard use. Install acoustical tiles true to alignment within a tolerance of one in 1000 and true to plane within a tolerance of one in 200.

END OF SECTION

ACOUSTICAL CEILING
SUSPENSION ASSEMBLIES

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide exposed ceiling suspension system, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.1.2 Related work described elsewhere:

1. Acoustical Ceilings Section 09 51 00

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Manufacturer's data: Within 30 calendar days after award of the contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.4.3 Delivery and Storage: Deliver all materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 EXPOSED GRID LAY-IN TILE SUSPENSION SYSTEM

The exposed ceiling suspension system shall be the Armstrong Prelude or Architect approved equal.

2.1.1 Main runners: Intermediate Duty ASTM C635.

2.1.2 Main runners and cross tees: Cold rolled, hot dipped galvanized steel and cap with standard white factory applied paint finish.

2.1.3 Angles: Cold rolled No. 7800, 7/8" x 7/8", hot dipped galvanized with standard white factory applied paint finish.

2.1.4 Outside miter molding: No. 7863 white 7/8" outside corner cover.

2.1.5 Ceiling areas over 1,000 sq.ft.: Must have horizontal restraint wire or rigid bracing.

2.1.6 Ceiling areas over 2,500 sq.ft.: Must have seismic separation joints or full height partitions.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.1.1 Follow the manufacturer's installation requirements for specified seismic zone.

3.2 COORDINATION

Use all means necessary to coordinate with other trades and to ensure the proper and adequate provision is made in the work of other Sections.

3.3 INSTALLATION

3.3.1 Main runners and hanger wires: Install runners at 48 inches on center, and be directly suspended by not less than 12 gauge galvanized steel wire. The hanger wires shall be installed in an exactly vertical position from the metal deck flute at 48 inches on center. Punch holes, through the sides of the flute, install hanger wire and wrap tightly at least 3 full turns. At each lay-in light fixture add two additional hanger wires to have one within 3 inches of each corner. Installing hanger wires to steel joists and dropping diagonally to runner members is not acceptable.

3.3.2 Cross tees: 48" long and interconnected with main tees to form 24" x 48 modules or 24" x 24" as shown on plan.

3.3.3 Wall angle moldings: Install at all vertical surfaces. Miter all corners.

3.3.4 Enclosures at light fixtures are not required.

END OF SECTION

RESILIENT FLOORING

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all resilient flooring, complete in place, as indicated on the Drawings, specified herein, or otherwise needed for a complete and proper installation of the Work of this Section. Leave extra stock of each color of tile for Owner as specified.

1.2 QUALITY ASSURANCE

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

1.3 SUBMITTALS

1.3.1 General: Comply with pertinent provisions of Section 01 33 23.

1.3.2 Manufacturer's data: Within 30 calendar days after award of contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. Samples of each item, color, and pattern available in the specified products from the proposed manufacturer.
4. Manufacturer's recommended methods of installation.

The manufacturer's recommended methods of installation, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the Work.

1.4 PRODUCT HANDLING

1.4.1 Delivery and storage: Deliver materials to the job site and store in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations.

1.4.2 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.4.3 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.5 EXTRA STOCK

1.5.1 Upon completion of the work of this section, deliver to the Owner an extra stock equal to 2% of each color and type of flooring.

PART TWO - PRODUCTS

2.1 MATERIALS, GENERAL

2.1.1 Colors and patterns shall be as selected by the Architect from standard colors and patterns available from the approved manufacturer in the specified types.

2.1.2 Adhesives shall be a waterproof and stabilized type as recommended by the manufacturer of the approved resilient material. Asphalt emulsions and other non-waterproof types will not be acceptable.

2.1.3 Concrete slab primer shall be a non-staining type as recommended by the manufacturer of the resilient material to be applied over it.

2.1.4 Rubber base shall be 4" high cove base as manufactured by Tarkett-Johnsonite or Architect approved equal. Color as selected by the Architect from standard colors of the approved manufacturer. Furnish pre-formed corners. Vinyl base is not acceptable.

2.1.5 Luxury vinyl tile as manufactured by Shaw or Architect approved equal.

2.1.5.1 LVT-1 – Style Number BD300 – Modular:

- a. Size: 7" x 48"
- b. Overall Thickness: 0.079"
- c. Finish: Opticlean Urethane
- d. Installation: Direct Glue
- e. Warranty: 5 years
- f. Color: As selected by the Architect from manufacturer's standard colors.

2.2 OTHER MATERIALS

All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be as recommended by the manufacturer of the resilient materials, used, and as approved by the Architect.

PART THREE - EXECUTION

3.1 INSPECTION

3.1.1 General: Examine the areas and conditions under which resilient flooring is to be placed. Correct conditions detrimental to the proper and timely completion of the Work. Remove all dust and debris. Fill slab as required to achieve totally smooth and level surface. Do not proceed until unsatisfactory conditions have been corrected.

3.1.2 Surface shall be smooth, level, at the required finish elevation, without more than 1/8" in 10'0" variation from level or slopes shown.

3.1.3 By beginning the work this subcontractor assumes all responsibility for any debris or imperfections that show through the floor material.

3.2 PREPARATION

3.2.1 Subfloors: Prior to start of laying tile units, broom clean or vacuum all surfaces to be covered and inspect the subfloors. Start of laying tile will indicate acceptance of subfloor conditions.

3.2.2 Concrete primer: Apply concrete slab primer if recommended by tile manufacturer, prior to application of the adhesive. Apply in compliance with manufacturer's directions.

3.3 INSTALLATION

3.3.1 General:

3.3.1.1 Install tile only after all finishing operations, including painting, have been completed and permanent heating system is operating. Moisture must be within limits recommended by tile manufacturer.

3.3.1.2 Place tile units with adhesive cement in strict compliance with the manufacturer's recommendation. Butt tile units tightly to vertical surfaces, thresholds, nosings and edgings. Scribe as necessary around obstructions and to produce neat joints laid tight, even and in straight, parallel lines.

3.3.1.3 Extend tile units into toe spaces, door reveals, and in closets and similar openings.

3.3.1.4 Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on the finish tile as marked in the subfloor. Use chalk or other non-permanent marking device.

3.3.1.5 Lay tile from center marks established with principal walls, discounting minor off-sets, so that tile at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 8" at room perimeters. Lay tile square to room axis.

3.3.2 Matching:

3.3.2.1 Match tiles for color and pattern by using tile from cartons in the same sequence as manufactured and packaged. Cut tile neatly to and around all fixtures. Broken, cracked, chipped or deformed tile are not acceptable.

3.3.2.2 Tightly cement tile to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks through tile, or other surface imperfections.

3.3.3 Edgestrips: Place the resilient edgestrips tightly butted to tile, and secure with adhesive. Provide edgestrips at all unprotected edges of tile, unless otherwise shown.

3.4 CLEANING AND PROTECTION

Remove excess adhesive or other surface blemishes from tile, using neutral type cleaners recommended by the tile manufacturer. Protect installed flooring from damage until acceptance by the Owner.

END OF SECTION

PAINTING

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Paint, caulk all joints of dissimilar materials, and finish all exterior and interior exposed surfaces listed on the Painting Schedule in Part Three of this Section, in accordance with the type of finish shown on the Finish Schedules in the Drawings and as specified herein. Tape and float all interior gypsum board surfaces. Provide firetaping as required. Existing walls shown to be painted on Finish Schedules in the Drawings shall be repaired (patched, filled, textured, etc.), if required, prior to painting.

1.1.2 Related work described elsewhere: Priming or priming and finishing of certain surfaces are specified to be factory performed or install performed under pertinent other sections.

1. Gypsum Board Assemblies Section 09 21 00

1.1.3 Work not included:

1.1.3.1 Do not include painting which is specified under other Section.

1.1.3.2 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.

1.1.3.3 Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section except as may be specified herein.

1.1.3.4 Do not paint any moving parts of operating units; mechanical or electrical parts such as valve operators, linkages, sinkages, sensing devices, and motor shafts, unless otherwise indicated.

1.1.3.5 Do not paint over any required labels or equipment identification, performance rating, name, or nomenclature plates.

1.1.4 Definitions: The term "paint" as used herein, means all 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

1.2.1 Qualification of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of workmen:

1.2.2.1 Provide at least one person who shall be present at all times during execution of the work of this Section who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all work performed under this Section.

1.2.2.2 Provide adequate numbers of workmen skilled in the necessary crafts and properly informed of the methods and materials to be used.

1.2.2.3 In acceptance or rejection of the work of this Section, the Architect will make no allowance for lack of skill on the part of workmen.

1.2.3 Paint coordination:

1.2.3.1 Provide finish coats which are compatible with the prime coats used.

1.2.3.2 Review other Section of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.

1.2.3.3 Upon request, furnish information on the characteristics of the specific finish materials to ensure that compatible prime coats are used.

1.2.3.4 Provide barrier coats over noncompatible primers, or remove the primer and reprime as required at no additional cost to the owner.

1.2.3.5 Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coating supplied under other Sections.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Material Safety Data Sheets (MSDS) shall not be submitted as part of the submittal package. They are not a requirement of the Contract Documents and will be returned to the Contractor.

1.3.3 Manufacturers' data: Within 30 calendar days after award of the Contract, submit:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
3. For information only, submit two copies of manufacturer's specifications, including paint analysis and application instructions for each materials. Indicate by transmittal that copy of each manufacturer's instructions has been distributed to the applicator.

Upon receipt of review comments, make all revisions and corrections, and resubmit if so required.

1.4 PRODUCT HANDLING

1.4.1 Delivery of materials: Deliver all materials to the job site in original, new, and unopened containers bearing the manufacturer's name and label showing at least the following information:

1. Name or title of the material,
2. Fed. Spec. number, if applicable,
3. Manufacturer's stock number,
4. Manufacturer's name,
5. Contents by volume for major constituents,
6. Thinning instructions,

7. Application instructions.

1.4.2 Storage of materials: Provide proper storage to prevent damage to, and deterioration of, paint materials.

1.4.3 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work materials of all other trades.

1.4.4 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.5 JOB CONDITIONS

1.5.1 Surface and Air Temperatures: Do not apply any paint materials when the temperature of surfaces to be painted and the surrounding air temperature are below 55 degrees F, unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect. HVAC equipment shall be functioning minimum 48 hours before painting shall begin.

1.5.2 Weather Conditions: Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceed 85%; or to damp or wet surfaces; unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect. Applications may be continued during inclement weather within the temperature limits specified by the paint manufacturer during application and drying period.

1.6 EXTRA STOCK

1.6.1 Amount: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 3% of each color, type, and gloss of paint used on the Work.

1.6.2 Packaging: Tightly seal each container and clearly label with the contents and location used.

PART TWO - PRODUCTS

2.1 PAINT MATERIALS

2.1.1 Design is based on use of paint products manufactured by Sherwin-Williams Company. Equal products by Benjamin Moore, Farrell Calhoun and Pittsburg Paints will be acceptable when approved by the Architect.

2.1.2 General: Provide the best quality grade of the various types of coatings as regularly manufactured by paint materials manufacturers approved by the Architect. Materials not displaying the manufacturer's identification as a standard best-grade product will not be acceptable.

2.1.3 Durability: Provide paints of durable and washable quality. Do not use paint materials which will not withstand normal washing as required to remove pencil marks, ink, ordinary soil, and similar material without showing discoloration, loss of gloss, staining, or other damage.

2.1.4 Colors and Glosses: The Architect will select colors to be used in the various types of paint specified and will be the sole judge of acceptability of the various glosses obtained from the materials proposed to be used in the Work.

2.1.5 Color Selection: The Architect shall select a basic color to be used on 70% of painted surfaces, The remaining 30% of the painted surfaces shall receive any of twelve colors selected from any of the manufacturer's standard colors. Refer to the finish schedule for any additional painting requirements.

2.1.6 Undercoats and thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2.1.7 Standards: Provide paint materials which meet or exceed the standard listed for each application in the Painting Schedule in PART THREE of this Section.

2.2 APPLICATION EQUIPMENT

2.2.1 General: 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.

2.2.2 Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by the use of the proposed application equipment.

2.3 OTHER MATERIALS

All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be new, first-quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect.

PART THREE - EXECUTION

3.1 SURFACE CONDITIONS

3.1.1 Inspection: Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturer's recommendations as approved by the Architect.

3.1.2 Discrepancies: Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 MATERIALS PREPARATION

3.2.1 General:

3.2.1.1 Mix and prepare painting materials in strict accordance with the manufacturer's recommendations as approved by the Architect.

3.2.1.2 Store materials not in actual use in tightly covered containers.

3.2.1.3 Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

3.2.2 Stirring: Stir all materials before application to produce a mixture of uniform density, and as required during the application of materials. Do not stir into the material any film which may form on the surface. Remove the film and, if necessary, strain the material before using.

3.3 SURFACE PREPARATION

3.3.1 General:

3.3.1.1 Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's recommendations as approved by the Architect.

3.3.1.2 Remove all 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.

3.3.1.3 Following completion of painting in each space or area, reinstall the removed items by using workmen skilled in the necessary trades.

3.3.1.4 Clean each surface to be painted prior to applying paint or surface treatment.

3.3.1.5 Remove oil and grease with clean cloths and cleaning solvents of low toxicity and a flash point in excess of 38 degrees C (100 degrees F), prior to start of mechanical cleaning.

3.3.1.6 Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

3.3.2 Preparation of wood surfaces:

3.3.2.1 Clean all wood surfaces until they are free from dirt, oil, and all other foreign substance.

3.3.2.2 Smooth all finished wood surfaces exposed to view, using wood filler (if required) and the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.

3.3.2.3 Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12% or less as measured by a moisture-meter approved by the Architect.

3.3.3 Preparation of metal surfaces:

3.3.3.1 Thoroughly clean all surfaces until they are completely free from dirt, oil, and grease.

3.3.3.2 On galvanized surfaces, use solvent for the initial cleaning and then treat the surface thoroughly with phosphoric acid etch. Remove all etching solution before proceeding.

3.3.3.3 Allow to dry thoroughly before application of paint.

3.3.4 Preparation of masonry:

1. Mixing of Pro-Mar Block Filler for spray application shall use a maximum of one quart of latex wall paint per gallon pail of block filler. Do not use water or solvent thinned paints. Do not thin block filler for roller application.

2. Prior to any painting work, a sample wall of block fill shall be installed under the Architect's representatives' observation and approval. This wall shall be the minimum standard for the entire work.
3. Application of block fill:
 - a. Uniformly spray apply block fill to the wall.
 - b. Roll with a medium mop roller (long nap rollers are not acceptable) to thoroughly embed block fill into the voids of the block. (Pinholes are not acceptable).
 - c. Apply a fast overspray of block fill to provide a uniform texture and eliminate roller marks.

3.3.5 Preparation of gypsum board surfaces:

3.3.5.1 Apply joint treatment as follows:

1. First and Second Coat: Sheetrock® All-Purpose Joint Compound.
2. Third Coat: Sheetrock® Plus 3 Lightweight Joint Compound.

3.3.5.2 Clean all gypsum board surfaces until they are free from dirt, oil, and all other foreign substance.

3.3.5.3 Gypsum Panel Joints: Finish all face layer joints and internal angles with a U.S. Gypsum Joint System installed according to manufacturer's directions. Spot exposed fasteners on face layers and finish corner bead, control joints and trim as required, with at least three coats of joint compound, feathered out onto panel faces and sanded smooth.

3.3.5.4 Gypsum Base Joints: Apply Imperial Tape over full length of all gypsum base joints; do not overlap at intersections. Firmly press Type P Tape along entire length with steel trowel to insure firm wrinkle-free attachment. When rapid drying conditions exist, use Durabond Joint System installed according to manufacturer's directions.

3.4 PAINT APPLICATION

3.4.1 General:

3.4.1.1 Slightly vary the color of succeeding coats. Do not apply additional coats until the complete coat has been inspected and approved. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.

3.4.1.2 Sand and dust between enamel coats to remove all defects visible to the unaided eye from a distance of five feet.

3.4.1.3 On all removable panels and all hinged panels, paint the back sides to match the exposed sides.

3.4.2 Drying:

3.4.2.1 Allow sufficient drying time between coats. Modify the period as recommended by the material manufacturer to suit adverse weather conditions.

3.4.2.2 Oil-base and oleo-resinous solvent-type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

3.4.3 Brush application: Brush out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

3.4.4 Spray application:

3.4.4.1 Confine spray application to metal framework, hollow metal doors and frames, and similar surfaces where hand brush work would be inferior.

3.4.4.2 Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass.

3.5 PAINTING SCHEDULE

All products listed below are manufactured by Sherwin Williams. Other manufacturers, when equal in quality and performance, will be considered for substitution.

3.5.1 Interior Concrete Block:

Semi-gloss enamel (total DFT = 11 mils)

1. Surface preparation: Remove all dirt, loose or excess mortar. Allow 30 days drying time before application.
2. First coat: S-W Pro Industrial Heavy Duty Block Filler, B42W150 (DFT 8 mils.)
3. Second and Third Coat: S-W ProMar 200 HP Zero VOC Latex Semi-gloss Enamel, B31-Series. (DFT 1.5 mils/coat.)

3.5.2 Interior Concrete Block:

Epoxy Paint (Total DFT = 18 mils).

1. Surface preparation: Remove all dirt, loose or excess mortar. Allow 30 days drying time before application.
2. First Coat: S-W Pro Industrial Heavy Duty Block Filler, B42W150. (DFT 8 mils.)
3. Second and third coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series.

3.5.3 Exterior Masonry:

1. Surface preparation: Remove all dirt, loose or excess mortar. Allow 30 days drying time before application.
2. First coat: S-W Loxon Block Surfacers, LX1W200. (DFT 10 mils.)
3. Second and third coat: S-W Loxon Self-Cleaning Acrylic Coating Flat, LX13-50 Series. (DFT 2.5 mils. per coat)

3.5.4 Interior Gypsum Board:

Semi-gloss Enamel (Total DFT 5.3 mils.)

1. Surface preparation: Set and spackle all nail & screw heads. Tape and cover all joints with compound, sand smooth and remove all dust prior to paint application.
2. First Coat: Textured sheetrock mud mixed with S-W PrepRite High Build Interior Latex Primer/Surfacers, B28W8601, thinned to painting consistency and applied with roller covered with lambs wool.

3. Second and Third Coat: S-W ProMar 200 HP Zero VOC Interior Latex Semi-Gloss Enamel, B31-1950 Series. (2.5 mils DFT/coat.)

3.5.5 Interior Gypsum Board:

Epoxy paint (Total DFT = 9.3 mils).

1. Surface preparation: Set and spackle all nail and screw heads, tape and cover all joints with compound, sand smooth and remove all dust prior to paint application.
2. First Coat: Textured sheetrock mud mixed with S-W ProMar 200 Zero VOC Interior Latex Primer, B28W12600.
3. Second and Third Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73Series .

3.5.6 Interior Gypsum Board:

Flat Finish

1. Surface preparation: Set and spackle all nail and screw heads, tape and cover all joints with compound, sand smooth and remove all dust prior to paint application.
2. First Coat: Textured sheetrock mud mixed with S-W PrepRite High Build Interior Latex Primer/Surfacer, B28W8601, thinned to painting consistency and applied with roller covered with lambs wool.
3. Second and Third Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-Series (4 mils wet, 1.4 mils dry per coat).

3.5.7 Interior Ferrous Metal:

Semi-gloss Enamel (Total DFT = 6.0 mils).

1. Surface preparation: Sand smooth and remove all dust prior to paint application
2. First Coat: S-W Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-1300 Series. (DFT 3 mils).
3. Second and Third Coat: S-W Pro Industrial WB Alkyd Urethane Semi-Gloss Enamel, B53-2150 Series. (1.5 mils DFT/coat).

3.5.8 Interior Ferrous Metal:

Flat Finish

1. Surface preparation: Remove all oil, dust, grese, dirt, loose rust, and other foreign material.
2. First Coat: S-W Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-1300 Series.
3. Second and Third Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42W2181.

3.5.9 Exterior Ferrous Metal:

Gloss (Total DFT - 9 mils).

1. Surface preparation: Sand smooth and remove all dust prior to paint application.
2. First coat: S-W Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-1300 Series.
3. Second and Third Coat: S-W Pro Industrial Urethane Enamel B54-150 Series (3 mils DFT/coat).

3.5.10 Interior Wood (painted):
Semi-Gloss Finish.

1. Surface preparation: Store all wood in dry, warm rooms. All surfaces shall be sanded smooth with the grain and never across it. Clean off all dust. Lightly sand between coats.
2. First Coat: S-W Premium Wall and Wood Primer, B28W8111.
3. Second Coat: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B344W8251.
4. Third Coat: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B344W8251

3.5.11 Interior Wood (painted):
Epoxy Finish.

1. Surface preparation: Store all wood in dry, warm rooms. All surfaces shall be sanded smooth with the grain and never across it. Clean off all dust. Lightly sand between coats.
2. First Coat: S-W Premium Wall and Wood Primer, B28W8111.
3. Second Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73 Series.
4. Third Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73 Series.

3.6 PROTECTION AND CLEAN UP

3.6.1 Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.

3.6.2 Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and, in particular, surfaces within storage and preparation area.

3.6.3 Place cotton waste, cloths and material which may constitute a fire hazard in closed metal containers and remove daily from site.

3.6.4 Remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove permanent lacquer finish.

3.6.5 This Subcontractor shall be responsible for the condition of the building or parts of the building in his charge, as well as the protection of adjacent work. Damage done to the work of other Subcontractors to such an extent that the work and/or materials cannot be restored to their original condition shall be replaced at the expense of this Subcontractor.

END OF SECTION

EPOXY COATINGS

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide seamless epoxy flooring with slip resistant finish, complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.

1.2 RELATED SECTIONS

- A. Division Three - Concrete

1.3 QUALITY ASSURANCE

- A. All materials must be recommended and manufactured by a single supplier to insure compatibility and proper chemical and mechanical bond.
- B. Surfacing shall be applied by a surfacing applicator approved by the Architect, with a minimum of seven (7) years experience installing the brand of surfacing in similar size and function projects. A list of ten (10) completed projects using the specified materials must be submitted proving seven (7) years experience by the lead mechanic.
- C. Surfacing applicator shall provide to the architect a completed list of jobs including the names of the Architect, General Contractor, Owner, telephone numbers of all concerned, materials used, quantity installed and date completed on similar projects.
- D. Surfacing applicator must provide a written guarantee for materials and workmanship between applicator and surfacing manufacturer for one (1) year.
- E. Surfacing applicator or manufacturer seeking approval of products other than what is specified must supply samples, full product information, technical data with specifications, certification from an independent testing laboratory that the product being submitted for approval meets all requirements of the performance properties specified within this specification, installation instructions and comply with the above quality assurances in writing fourteen (14) days before bid letting. Omission of any item will result in an automatic rejection.
- F. Bidders will be notified by addendum of substitute surfacing materials, if approved.

1.4 SUBMITTALS

- A. Surfacing applicator shall submit samples of color and textures for Architect's approval.
- B. Prior to commencing work, at architect's discretion, applicator shall install a 100 square foot sample on the job of desired color and texture and when approved, this will serve as the standard for the entire project.

1.5 PRODUCT STORAGE AND ENVIRONMENTAL CONDITIONS

- A. Material temperatures shall be a minimum of 55°F before use.
- B. Work on seamless flooring shall not commence until the building can be maintained at a minimum temperature of 55°F for 48 hours before, during and 48 hours after application. Areas shall also be broom clean and reasonably dust free and shall have adequately controlled ventilation with bright, uniform lighting.

1.6 PROJECT CONDITIONS

- A. Before commencing work, ensure environmental and site conditions are suitable for application and curing.
- B. Surfaces shall be acceptable in accordance with flooring manufacturer's recommendations.
- C. Notify Architect and Contractor in writing of unsuitable surfaces and conditions. Commencement of work shall imply acceptance of surfaces and working conditions.
- D. Recommended Moisture Vapor Transmission Considerations:
 - 1. Placement of on-grade slabs over a Class A vapor retarder as defined by ASTM E-145.
 - 2. A water cement ratio of 0.45 and 0.5.
 - 3. Curing by ASTM C-171 sheet materials for curing concrete.
 - 4. A slump in the range of 3 to 4 inches which can be increased by the use of super plasticizers.

1.7 PROTECTION

- A. Protect adjacent surfaces from damage resulting from work of this trade. If necessary, mask and/or cover adjacent surfaces, fixtures, cabinet work, equipment, etc. by suitable means.

1.8 WARRANTY

- A. Applicator shall notify manufacturer of project requirements before bidding. An officer of the manufacturing company shall provide written statement before bidding; to the Architect, that they accept single source warranty for entire installation including labor for one year. By agreeing to sign warranty and supply product, manufacturer waives all rights of sellers' liability of warranty and limitation. Warranty shall include removal and replacement if proven defective. Defective items are, but not limited to debonding, regionalized discoloration, excessive wear and staining by bodily fluids. Non-acceptance of above by manufacturer is grounds for rejection of product.

PART TWO - PRODUCTS

2.1 MATERIALS

- A. Seamless floor covering, Desco Quartz Cremona TG Floor, as manufactured by Desco Coatings, Inc. 1-800-426-4164, provided with a 4" high turned up coved base with 1" radius cove as indicated on drawings.
- B. Approved Equal Manufacturer and System:
Tnemec Co., Inc.
Series 223 Deco-Trowel
- C. Binder and all successive grout and top coats shall be 100% solids clear/epoxy resin. Ceramic coated quartz aggregates as supplied by Desco Coatings are to be used to achieve all color. No pigmented epoxy base or top coats allowed.
- D. Minimum Performance Characteristics:
- | | | |
|----|-----------------------------------|-------------|
| 1. | Compressive Strength (ASTM C-579) | 10,000 psi |
| 2. | Tensile Strength (ASTM C-307) | 2,250 psi |
| 3. | Flexural Strength | 4,000 psi |
| 4. | Shore D Hardness (ASTM D-2240) | 85-90 |
| 5. | Bond Strength (ASTM D-4541) | 425 psi |
| 6. | Abrasion Resistance (ASTM D-4060) | 0.08 gm |
| 7. | Pot Life | 35 min |
| 8. | Cure Time @ 77° F | 10-12 hours |

Epoxy top coats shall produce no color shift after exposure to fluorescent lighting on the "b" axis yellow index after 3 weeks exposure.

20% Hydrochloric Acid	10% Lactic Acid
Urine	Tea
Coffee	Mustard
Ethyl Alcohol	Mercurochrome
	Betadyne

2.2 COLORS

- A. Colors shall be as selected by the Architect from manufacturers standard range of colors.

PART THREE – EXECUTION

3.1 TESTING OF CONCRETE SUBSTRATE

One of the following three methods shall be used to determine moisture content of slab at time of application. These tests only measure the specific area tested at the time of the test and are not predictors of future substrate conditions.

- A. Using a Tramox concrete moisture detection device, firmly apply the test apparatus to concrete that has had sealers or other subsequent coatings removed. The readings shall be 4.2% or less. If readings are higher, use ASTM F-2170 for non conditional spaces and/or ASTM F1869 for conditioned spaces.
- B. ASTM F-2170 in site Relative Humidity Test. Follow test procedures of manufacturer of testing equipment. Reading should be below 80%. If above 80%, use the next test method below. (Only if space is conditioned.)
- C. ASTM F-1869 Calcium Chloride Moisture Vapor Transmission Test. Follow test procedures of manufacturers of MVT kits. Results should be below 3 to 4 lbs/1,000 square feet/24 hours.

3.2 FLOORING PREPARATION

- A. Surface must be clean, sound and dry.
- B. Effectively remove concrete laitance on accessible floor surfaces by mechanical shot blast. Acid etching is not acceptable.
- C. Areas where flooring is existing must be cleaned to remove all floor material, grease or any residue that might retard interfacial adhesion between substrate and surfacing.

3.3 FLOORING APPLICATION

- A. Apply flooring in accordance with manufacturer's printed instructions, employing lead mechanic qualified under the quality assurance portion of this specification, using equipment specifically designed for this purpose.
- B. Thickness of 3/16 inch.
 - 1. Desco Quartz Cremona TG is a hand troweled grade 11 Desco quartz aggregate with 20% of grade 28 as a filler. The system should be hand troweled to 3/16" thickness over epoxy primer.
- C. Install integral cove base to height of 4" with 1" radius cove.
 - 1. Trowel apply vertical cove base.
 - 2. Hand sand cove base.
 - 3. Apply three coats of resin to assure a smooth surface and cove.
 - 4. Do not allow resin to puddle in cove.

- E. Finished work shall match approved samples; be uniform in thickness, sheen, color, pattern, and texture; and be free from defects detrimental to performance.

3.2 PROTECTION

- A. After completion of flooring the General Contractor/Owner shall protect flooring from damage by other trades.

END OF SECTION

SIGNAGE

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide interior door signs, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of manufacturer: Products used in the work of this Section shall be produced by Manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.3 SUBMITTALS

1.3.1 General: Comply with the provisions of Section 01 33 23.

1.3.2 Product data: Within 30 calendar days after award of Contract, submit:

1. Complete materials list showing all items proposed to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
3. Manufacturer's recommended methods of installation.
4. Complete descriptive data on fasteners proposed for each type of wall construction, recommended mounting locations, and mounting instruction.

The manufacturer's recommended methods of installation, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the Work.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 INTERIOR DOOR SIGNS

2.1.1 Acceptable Manufacturers: Archway Graphic Designs, Little Rock, Arkansas; Best Sign Systems, Montrose, Colorado or Architect approved equal.

2.1.2 Schedule: Provide for door signs at each new interior door except at furnace closets. Exact wording and numbers will be provided by Owner.

2.1.3 Design: Manufacturer's standard monolithic tactile plaque constructed of one material utilizing a thermoforming process, which provides a monolithic plaque sign. The sign body, face, raised text and Braille are compression molded to form a single dimensional component.

1. Thickness: 1/8"
2. Tactile Characters/Symbols: Raised 1/32 inch from sign plate face.
3. Lettering Style: Helvetica regular, upper case letters, minimum height 5/8", maximum height 2".
4. Braille: Grade 2 braille, placed directly below last line of characters.
5. Contrast: Letters, numbers and symbols shall contrast with background as selected by the Architect.
6. Panel Shape and Sizes: Rectangular. Size shall be 5" x 7"; restrooms shall be 8" x 6".
7. Background Standard: Painted custom colors, Matthews acrylic polyurethane paint, subsurface.
8. Surface Texture: Standard – Suede – Low Gloss 12 gloss units +/- 3 units.
9. Surface Protection: Matthews acrylic polyurethane, satin finish clear coat.
10. Painted Backer: All signs mounted to glass shall have painted backer.

PART THREE - EXECUTION

3.1 DOOR SIGNS

Where permanent identification is provided for, signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 inches above the finish floor to the centerline of the sign. Mounting location for such signage shall be so that a person may approach within 3 inches of signage without encountering protruding objects or standing within the swing of a door. Interior signs to be mounted to wall with double-sided vinyl tape and silicone adhesive. Exterior signs to be predrilled in (4) corners and attached with appropriate screws (and anchors) and decorative washers (nickel finish) to exterior wall surface.

END OF SECTION

TOILET COMPARTMENTS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Provide all toilet partitions and urinal screens, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualifications of Manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar products and with a history of successful production acceptable to the Architect.

1.2.2 Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specific requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

1.3.1 General: Comply with provisions of Section 01 33 23.

1.3.2 Product data: Within 30 calendar days after award of the Contract, submit:

1. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
2. Manufacturer's recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.
3. Complete materials list of all items proposed to be furnished and installed under this Section.
4. Shop drawings and sufficient dimensional data to enable proper co-ordination of installation of concealed items of support.

1.4 PRODUCT HANDLING

1.4.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect work and materials of all other trades.

1.4.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 TOILET PARTITIONS

Provide floor anchored overhead braced solid plastic, homogenous colored partitions by Scranton Products, Inc. or approved equal.

2.1.1 All hardware, including coat hook/bumper shall be solid brass, chrome plated or stainless steel and guaranteed for twenty years. "Zamack" chrome plated non-ferrous castings are not acceptable.

2.1.2 All screws shall be stainless steel one-way machine screws.

2.1.3 All hinge brackets, strike and keeper will be thru-bolted with hex bolts having one-way theft proof heads.

2.1.4 Solid Plastic - high density polyethylene with homogenous color throughout, not less than 1" thick, seamless construction with edges eased.

2.1.5 Urinal screens shall have post from floor to headrail brace. Headrail brace shall be continuous across entire length of urinals.

2.1.6 Colors shall be selected from the manufacturer's full range of colors.

PART THREE - EXECUTION

3.1 FABRICATION

Fabricate in strict accordance with the manufacturer's product data as approved by the Architect.

3.2 PREPARATION FOR INSTALLATION

3.2.1 Coordination: Properly coordinate with all other trades as required to ensure adequate provision for anchorage of the work of this Section and for proper interface with the work of all other trades.

3.2.2 Inspection: Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

Install the Work of this Section straight and plumb within a tolerance of one in 200 horizontally and one in 500 vertically, rigidly anchoring into position for long life under hard use. Perform all drilling and cutting for installation of anchors only at locations which will be concealed in the finished work. Provide a uniform vertical edge clearance for doors of approximately 3.16" resting open at approximately 30 degrees when the latch is not engaged.

END OF SECTION

TOILET ACCESSORIES

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide all toilet room accessories, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

- A. Qualification of manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1.3 SUBMITTALS

- A. General: Comply with the provisions of Section 01 33 23.
- B. Product data: Within 30 calendar days after award of Contract, submit:
 - 1. Complete materials list showing all items proposed to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 3. Manufacturer's recommended methods of installation.
 - 4. Complete descriptive data on fasteners proposed for each type of wall construction, recommended mounting locations, and mounting instructions.

The manufacturer's recommended methods of installation, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation methods used on the Work.

1.4 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 GENERAL

- A. Anchors and fasteners: Provide anchors and fasteners capable of developing a retaining force commensurate with the strength of the accessory to be mounted, and well suited for use with the supporting construction. Where exposed fasteners are permitted, provide oval head fasteners with finish matching the accessory. Provide masonry anchors for wall installation and stainless steel hex bolts for partition installation.
- B. Finish: All accessory items shall be stainless steel with satin finish.
- C. Design is based on use of products manufactured by Bradley, and catalog numbers of that manufacturer are given as an indication of the quality and style required. Equal products by Bobrick or other manufacturers, approved by the Architect, will be acceptable in accordance with the General Conditions.

2.2 ACCESSORY ITEMS

- A. Grab bars: (Locate as shown on drawings.) Bradley 812 Series in lengths as shown on drawings. Mount at 34" above floor using mounting kit as recommended by manufacturer at block walls.
- B. Mirror: (Locate as shown on drawings.) Bradley Model 780, mounted with bottom of reflective surface at 40" above the floor. Use stainless steel, tamper proof screws and metal expansion shield masonry anchors (plastic anchors are not acceptable).
- C. Coat hooks: (One per toilet stall.) Bradley Model 9115 with concealed fasteners.

PART THREE - EXECUTION

3.1 INSPECTION

Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

Throughout construction of substrate surfaces, use all means necessary to ensure proper and adequate provision for concealed support devices, and for finished openings, to receive the Work of this Section.

3.3 INSTALLATION

Install the Work of this Section in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components plumb, level, square, and firmly into position for long life under hard use.

END OF SECTION

FIRE EXTINGUISHERS

PART ONE - GENERAL

1.1 DESCRIPTION

Provide all fire extinguishers, brackets and cabinets, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

1.2.1 Qualification of manufacturer: Use products in the work of this Section produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect. Conform to NFPA 10 requirements for portable fire extinguishers. Provide fire extinguishers, cabinets and accessories by single manufacturer.

1.2.2 Qualifications of installers: Use skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 REFERENCES

- A. NFPA 10 – Portable Fire Extinguishers
- B. ADA Accessibility Guidelines
- C. UBC Standard 7-5 (ASTM E-814-83)

1.4 SUBMITTALS

1.4.1 General: Comply with provisions of Section 01 33 23.

1.4.2 Manufacturers data: Within 30 calendar days after award of Contract, submit:

- 1. Complete materials list of all items proposed to be furnished and installed under this Section.
- 2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.

1.5 PRODUCT HANDLING

1.5.1 Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

1.5.2 Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 GENERAL

2.1.1 This specification is written around J.L. Industries, Bloomington, MN. The following manufacturer is accepted as equal, subject to the requirements of the specifications and drawings.

Larsen's Manufacturing, Minneapolis, MN

2.2 FIRE EXTINGUISHERS

2.2.1 General: Provide Cosmic 10E Multi-purpose Dry Chemical extinguisher as manufactured by J.L. Industries of Bloomington, MN.

2.3 CABINETS

Provide Ambassador 1017, V13, color epoxy coated trim, door and tub, as manufactured by J.L. Industries of Bloomington, MN. Tub shall be semi-recessed or surface mounted as shown on drawings. Color to be selected from manufacturer's stock colors by the Architect.

2.4 FIRE RATING

Furnish fire-rated cabinet with Fire-FX option as manufactured by J.L. Industries of Bloomington, MN, at all rated wall locations as indicated on plans. Cabinet to be fabricated in accordance with the Warnock Hersey certified design and shall carry the Warnock Hersey label for 1 and 2 hour combustible and non-combustible walls.

Cabinet to be fabricated in accordance with UBC 43-6 (ASTM E814-88) to measure fire resistive performance.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 INSTALLATION

Install cabinets in locations and at mounting heights as shown on the Drawings, and in accordance with the manufacturer's instructions. Provide all grounds, brackets, anchors, trim, and accessories for a complete installation.

3.3 Install using F.E. brackets where cabinets are not called for in mechanical or electrical rooms.

END OF SECTION

CANOPIES

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Provide extruded aluminum overhead hanger rod style canopy system including all accessories, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.2 QUALITY ASSURANCE

- A. Qualifications of Manufacturers: Products used in the work of this Section shall be produced by Manufacturers regularly engaged in manufacture of similar products and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

1.3 SUBMITTALS

- A. General: Comply with provisions of Section 01 33 23.
- B. Product data: Within 30 calendar days after award of the contract, submit:
 - 1. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 2. Design Data: Design calculations bearing the seal of a Registered Professional Engineer, licensed in the state where the project is located. Design calculations shall state that the walkway cover system design complies with the wind requirements of ASCE 7, the stability criteria of applicable building code, and all other governing criteria.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.
 - 4. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 5. Shop drawings and sufficient dimensional data to enable proper co-ordination of installation of concealed items of support.

1.4 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during and after installation and to protect work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART TWO - PRODUCTS

2.1 MANUFACTURER

- A. “Super Lumideck” extruded aluminum overhead hanger rod style canopy system shall be as manufactured by Mapes Industries, Inc., Lincoln, Nebraska or Architect approved equal.

2.2 MATERIALS

- A. Decking, flat soffit, and fascia shall be extruded aluminum, alloy 6063-T6, profile as shown on the drawings.
- B. Hanger rods and attachment hardware shall be galvanized/zinc plated.
- C. Fascia shall be standard 8” extruded “J” style (minimum .125 aluminum).

2.3 FINISHES

- A. Architect shall select finish from manufacturer’s finishes to include powder coating and standard two-coat Kynar® colors.

2.4 FABRICATION

- A. All connections shall be mechanically assembled utilizing 3/16” fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.
- B. Decking shall be designed with interlocking extruded aluminum members with mechanical fasteners field applied to provide structural integrity for the completed assembly.
- C. Concealed drainage. Water shall drain from covered surfaces into integral fascia gutter and directed to either the front for front drainage or to the rear for ground level discharge via one or more designated downspouts.

PART THREE - EXECUTION

- A. Installation of canopy system shall follow printed manufacturer's recommendations as approved by the Architect.
- B. Erect the entire installation straight and true in accordance with standard construction procedures as approved by the Architect.
- C. All surfaces shall be cleaned thoroughly prior to acceptance of canopies.

END OF SECTION

ROLLER SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roller shades.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.
- B. Section 09 21 00 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.
- C. Section 09 51 00 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.3 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
 - 1. Prepare shop drawings on Autocad or Microstation format using base sheets provided electronically by the Architect.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

- F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- F. Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up in window designated by Architect.
 - 2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 WARRANTY

- A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.
- B. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.
- C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: MechoShade Systems, Inc., which is located at: 42-03 35th St., Long Island City, NY 11101; Tel: 718-729-2020; Fax: 718-729-2941.
- B. Acceptable manufacturer: Draper, Inc., Spiceland, Indiana

2.2 ROLLER SHADE

- A. Shades:
 - 1. Mounting: Surface mounted with fascia.
 - 2. Clutch Mechanism: All metal single component clutch. (Mecho 5 or Draper NEXD acceptable or approved equal.)
 - 3. Configuration: Single solar shade cloth.
 - 4. Solar Shade cloths:
 - a. Fabric: ThermoVeil 1000, 3 percent open, 2 by 2 open basket-weave pattern.
 - b. Color: Selected from manufacturer's standard colors.
 - 5. Solar Blackout Shade cloth: Where shown on drawings. Color shall be selected from manufacturer's standard colors.
 - 6. Operation: Manual
- B. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
 - 2. Shade Band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive / brake mechanism.
 - c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.3 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 - 1. Exposed blackout hembar with light seal.
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.
- F. Blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.
 - 1. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.
 - 2. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moire effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.4 COMPONENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

2.5 ACCESSORIES

- A. Fascia:
 - 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 - 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 - 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 - 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 - 5. Notching of Fascia for manual chain shall not be acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

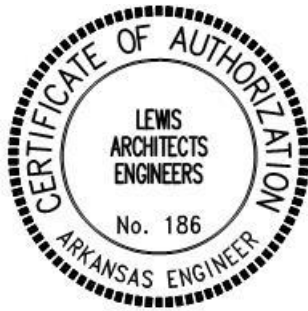
3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

The Engineer of Record for Industry Technology Renovation, Southern Arkansas University Tech, Camden, Arkansas Division 22 of the specifications.

October 23, 2025



PLUMBING

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: This specification includes the furnishing of all labor, materials, tools, equipment, drayage, rigging, fees, etc., unless specifically furnished by others, necessary or reasonably required for the complete installation and operation of all the work as shown on the drawings or as required and/or as herein specified. The entire work shall be delivered complete in perfect working order and to the entire satisfaction of the Architect.

1.1.2 The scope of work shall include the general listings as shown below. This contractor shall furnish and install all required pipe, fittings, valves, hangers, supports, sleeves, inserts, traps, and other such equipment, items, and appurtenances as may be required for complete and operative systems, including all parts auxiliary to the systems whether or not specifically set forth herein and/or shown on the drawings.

1. Systems of sanitary waste and vent piping.
2. Systems of domestic cold and hot water.
3. Systems of Compressed Air
4. Systems of gas piping.
5. Plumbing fixtures and accessories.
6. Insulation.
7. Miscellaneous equipment and accessories.
8. Tests, inspection, balancing and adjustment.

1.2 APPLICABLE GENERAL SPECIFICATIONS AND REGULATION

1.2.1 The General Conditions, Supplementary Conditions, Information to Bidders and other pertinent documents, as issued by the Architect, are a part of these specifications and shall be complied with in every respect.

1.2.2 All plumbing work and equipment, in whole or in part, shall conform to the applicable portions of the latest edition of the following ordinances, codes, and regulations in effect on the date of invitation for bids, which shall form a part of this specification.

1. National Electrical Code.
2. American Gas Association Recommended Practices.
3. National Fire Protection Association Recommended Practice.
4. Local, City and State Codes and Ordinances.
5. American Society of Mechanical Engineers Plumbing and Air Conditioning Codes.

1.2.3 The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only, (i.e.) American Society for Testing and Materials (ASTM). Publications:

- | | |
|--------|--|
| D 2665 | Poly Vinyl Chloride (PVC) Drain, Waste and Vent Pipe and Fittings. |
| D 2321 | Underground Installation of Thermoplastic Pipe for Sewers & Other Gravity Flow Applications. |

1.2.4 Should any part of the drawings or specifications be found to be in conflict with applicable codes or ordinances, the Contractor shall notify the Architect before submitting his bid. After entering into the contract, the contractor shall complete all work necessary to meet the requirements of all codes or ordinances without additional expense to the Owner.

1.2.5 The contractor shall not begin any building construction until possessing a copy of official acceptance of the Arkansas State Department of Health which shall be provided by the Architect.

1.2.6 Prior to final acceptance of the project, the contractor shall provide the Architect a written Certificate of Inspection covering all phases of the installation by the State of local Plumbing Administrative authority.

1.2.7 All potable water system components shall be "Lead Free" in accordance with Section 1417 of the Safe Drinking Water Act (42 U.S.C. 300g-6) and shall be certified as being in compliance with NSF/ANSI 372 or Annex G of NSF/ANSI 61.

1.3 SUBMITTALS

1.3.1 The Contractor shall furnish electronic shop drawings using the submittal procedure as detailed in Section 01 33 23. Provide cover sheet with project name and contractor name along with table of contents.

1.3.2 All submittals must be on the manufacturer's standard certified submittal sheets or other approved sheets; faxed material will not be accepted. Each item must be marked with the symbol, letter, or number designating it in the specifications or on the plans and items must be arranged in the order specified or scheduled.

1.3.3 All performance, data, details, dimensions, special features and accessories must be clearly marked.

1.3.4 All differences between equipment specified and that submitted must be clearly indicated.

1.3.5 Substitutions will not be considered without prior approval from the engineer.

1.3.6 Shop Drawings are required even though the equipment is as specified.

1.3.7 Provide Shop Drawings on the following Items:

1. Plumbing fixtures and accessories.
2. Valves.
4. Documentation of water and sewer piping type and manufacturer.
5. Piping labels and valve tags.
6. Water hammer arrestors.
7. Miscellaneous equipment and accessories.

1.3.8 The type and capacity of the various equipment and material specified herein by manufacturer's name and catalog number indicate the minimum acceptable qualifications required for this installation. Products of other manufacturers, with comparable qualifications, will be acceptable, if approved by the Architect, unless specifically stated otherwise. NO PREFERENCE WILL BE GIVEN TO THE MAKE OF ITEMS LISTED, provided all essential requirements of this specification relative to materials, capacity and performance are met. The bidder will furnish a statement giving a complete description of all points wherein the equipment he proposes to furnish differs from the specification. Failure to furnish such a statement within thirty days after award of the Contract will be interpreted to mean that the bidder agrees to furnish items specified in the specifications or on the plans.

1.3.9 If the substituted equipment actually furnished under these specifications requires the use of larger or more connections, or if they are different arrangement than those shown on drawings, or specified under these specifications, such additional or larger connections shall be installed to the complete satisfaction of the Architect without added cost to the Owner.

1.3.10 Should a substitution be approved for use in lieu of that specified and should the substitute material prove defective or otherwise unsatisfactory, in the judgment of the engineer, for the service required, within the guaranty period, the Contractor shall replace the material or equipment as originally specified without additional cost to the Owner.

1.3.11 If submittals are "not approved" or marked "revise and resubmit", the complete package shall be corrected and returned for review. The contractor may provide a separate bound submittal, with a cover sheet, which includes only the sections marked "not approved", or "revise and resubmit". Any additional submittal data requested shall also be provided in resubmittal.

1.4 COORDINATION

1.4.1 Chases, recesses and other openings in the building construction required for the location of pipes, or other mechanical equipment, will be provided by the General Contractor. The Mechanical Contractor shall advise the General Contractor of the sizes and locations, and furnish the necessary drawings in sufficient time to allow for provision of same; otherwise the additional cost caused thereby shall be paid by the Mechanical Contractor.

1.5 FEES AND PERMITS

1.5.1 Contractor shall pay for all fees, permits and charges for utility connections and initial boiler inspections. This includes all fees required for improvement district non-refundable or refundable contribution. Contractor shall contact utility company prior to bid for connection charges.

1.6 DRAWINGS

1.6.1 The drawings are diagrammatic and indicate the extent and general arrangement of the various systems. If any departures from these drawings are deemed necessary by this contractor, detailed drawings and descriptions of these departures and a statement of the reasons therefore shall be submitted to the Architect for approval as soon as practical. No departures from the arrangements shown on the drawings shall be made without the prior written approval of the Architect.

1.6.2 Coordination of drawings and work: The drawings showing the extent and arrangement of the work of a particular trade must be used, together with the drawings showing the extent and arrangement of the work of the other trades, and this Contractor shall lay out his work with due consideration for the other trades and shall be responsible for calling to the attention of the Architect any interferences encountered. Such interferences shall be investigated and called to the attention of the Architect before any material is fabricated. Relocation resulting from interferences shall be made at no additional cost to the Owner. This Contractor shall cooperate with the other contractors and subcontractors on the job and shall arrange and carry on his work in such manner that none of the contractors shall be hindered or delayed at any time.

1.7 OPERATION AND MAINTENANCE MANUALS

1.7.1 Refer to Section 01 77 19 – Contract Closeout for closeout requirements.

1.7.2 A complete double index shall be included: (1) listing the products alphabetically by name, and (2) listing the names of the manufacturers of mechanical products alphabetically with their addresses, and the names and addresses of the local sales representative.

1.8 CONTRACTOR REVISED DRAWINGS

1.8.1 The contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes shall be kept by accurately making all changes on a set of prints in the site construction office during the progress of the job. Exact location of all underground utility service entrances and their connections to utility mains as well as all valves, etc., which will be concealed in the finished work shall be accurately indicated on the drawings by measured distances. Upon completion of the work and prior to final payment, the contractor will furnish to the Architect the set of "as-built" prints, and a photo copy, legibly and accurately marked to indicate all changes, additions, deletions, etc., from the Contract Drawings.

1.9 UTILITIES, LOCATIONS, AND ELEVATIONS

1.9.1 Locations and elevations of the various utilities, included within the scope of this work have been obtained from utility maps and/or other substantially reliable sources and are offered separate from the contract documents as a general guide only, without guarantees as to accuracy. This contractor shall examine the site and shall verify to his own satisfaction the location and elevation of all utilities and shall adequately inform himself of their relation to the work before entering into a contract.

1.10 VISITING SITE

1.10.1 The Contractor shall visit the site of this building before submitting a proposal on this work, and shall thoroughly familiarize himself with the existing conditions. Failure on his part to do this will not be cause for extra expense after the contract is signed, by reason of unforeseen conditions.

1.11 STANDARD PRODUCTS

1.11.1 Each item of equipment furnished under this specification shall be essentially the standard product of the manufacturer. Where two or more units of the same kind or class of equipment are required, these shall be the products of single manufacturer; however, the component parts of the equipment need not to be the products of one manufacturer. All material and equipment shall be of the best quality normally used in good commercial practice and shall be the product of a reputable manufacturer. Each major component shall bear a name plate giving the name and address of the manufacturer and the catalog number of designation.

1.12 STORAGE OF MATERIALS

1.12.1 The Contractor shall be responsible for the proper care of his materials, equipment, etc., delivered at the sites. Building materials, equipment, etc., may be stored on the premises, but the placing of same shall be subject to the approval of the Architect.

1.12.2 When any room in the building is used by the Contractor as a shop, store room, etc., he shall be responsible for any repairs, patching or cleaning arising from such use. He shall protect and be responsible for any damage or loss that may occur during this period. He shall handle all material as desired, so that it may be inspected by the Architect.

1.13 EQUIPMENT FURNISHED UNDER OTHER SECTIONS

1.13.1 This Contractor shall provide all necessary material and labor for the connection to the mechanical and electrical systems of all fixtures and equipment requiring such connections, and which fixtures and equipment are furnished by the Owner or are specified under other sections of these specifications. All drainage connections to these fixtures and this equipment shall be trapped. If any such fixtures or equipment are not delivered prior to final acceptance, the services shall be capped or plugged at walls or floors as directed, and shall be left ready for future connection. All branch water, gas, and other service lines to fixtures and equipment items shall be individually valved.

1.14 CLOSE-OUT DOCUMENTS

1. Operation and maintenance manuals (Section 22 01 00, paragraph 1.7).
2. Approved shop drawings (Section 22 01 00, paragraph 1.3).
3. As-built drawings (Section 22 01 00, paragraph 1.8).

PART TWO - PRODUCTS

2.1 PIPE

2.1.1 Soil, waste and vents, interior:

2.1.1.1 Underground and above ground soil, waste and vent pipe, inside building and extending 5'-0" outside shall be schedule 40 PVC complying with ASTM D2665 as manufactured by Eslon Thermoplastics or equal. No PVC waste will be accepted for final connection of lavatories, sinks, water coolers or similar fixtures. PVC cellular core (foam core) pipe and fittings are not acceptable.

2.1.1.2 Fittings shall be solvent welded DWV-PVC, complying with ASTM D2665 Standard, and listed by NSF as manufactured by Lasco Fluid Distribution Products.

2.1.1.3 The bedding and cover material for PVC piping shall be crushed stone (see 3.11.2).

2.1.1.4 PVC closet flanges shall have pre-drilled holes in lieu of adjustable slots.

2.1.2 Domestic water piping, interior:

2.1.2.1 Interior piping shall be type "L" copper above grade. Galvanized pipe shall not be used in any instance.

2.1.2.2 Water hammer control:

1. Arrestors shall be provided on all gang toilet headers (hot and cold) and as indicated on the drawings, shall be sized and applied in accordance with the Plumbing and Drainage Institute Standard Pdi-WH-201. Equipment shall be Precision Plumbing Products, SC Series or Sioux Chief Hydra-Rester. Locate each arrestor at the end of the branch between the last two fixtures and an additional arrestor at the midway point for branches exceeding 20 feet.
2. All arrestors shall be maintenance free and concealable in wall, pre-tested to last life of system.
3. Air chambers are not acceptable.

2.1.3 Soil, waste, and vents – exterior:

2.1.3.1 Lines beyond 5'0" from building line shall be SDR-26 heavy wall PVC gasketed sewer pipe. Piping shall be as manufactured by Charlotte Pipe or approved equal.

2.1.3.2 PVC pipe for sanitary sewers shall conform to the latest revision of ASTM Designation D3034 (Type PSM) and shall have a minimum Standard Dimension Ratio (SDR) of 26. The pipe shall have a minimum pipe stiffness (F/dY) of 115 psi at 5% deflection as defined in ASTM D2412.

2.1.3.3 The pipe shall be made of a plastic having a cell classification of 12454-B as defined in ASTM D1784. All pipe and fittings shall be tested in accordance with ASTM Designations D2412, D2152, and D2444.

2.1.4 Gas Piping:

2.1.4.1 Above grade:

2.1.4.1.1 All pipe shall be schedule 40 black steel assembled with 150 pound black malleable iron fittings. Piping exterior of building shall be painted with a rust-retardant, light grey enamel paint. Pipe shall be painted where rising on building. All fittings and joints shall be painted same as pipe. No unpainted pipe or fittings will be allowed. All valves shall be screwed. Pipes 2-1/2" and larger must be welded.

2.1.5 Compressed Air Piping:

2.1.5.1 Compressed air piping shall be Type L copper tube with wrought-copper fittings and soldered joints. Use lever hand bronze body ball valves. Hangers shall be as specified in 2.3.3 for exposed copper piping.

2.2 PIPE UNIONS

2.2.1 Unions or flanges shall be used at connections to all equipment and elsewhere as required in the erection of the pipe or installation of valves to facilitate dismantling, but shall not be installed in concealed spaces unless suitable access is provided.

2.2.2 Unions on ferrous pipe 2" or smaller shall be Crane No. 1280, 150 pound, malleable iron, ground joint unions. Unions on brass or copper pipe 2 inches or smaller shall be Crane 125 pound, brass, ground joint cast iron, gasket type, flange unions. Gaskets for flanged unions shall be of the best quality fiber, plastic, or leather. Unions on galvanized piping shall be galvanized and unions on black piping shall be black. Where copper to steel pipe unions, couplings or joints are required, they shall be made outside foundation walls of building, except those joints occurring on equipment inside of building, which shall be placed in accessible places.

2.3 PIPE SUPPORTS

2.3.1 All pipe shall be supported from the building structure by means of approved hangers and supports so as to maintain required grade and pitch, prevent vibration and provide for expansion and contraction.

2.3.2 Where equipment, piping or ducts are to be supported by concrete, install anchor bolts or inserts before concrete is poured. Inserts shall be Grinnell No's. 279 or 282, or approved equal. Expansion shields and power-actuated inserts may be used provided hangers are suspended from an angle which is fastened in place by the bolts and shields, or inserts.

2.3.3 Plumbing piping hangers and supports shall conform to ASME B31.9 and ASTM F708.

1. Hangers for pipe sizes 1/2 inch to 1-1/2 inch shall be malleable iron, adjustable swivel, split ring Grinnell Fig. 104, or approved equal.
2. Hangers for pipe sizes 2 inch and over shall be carbon steel adjustable, clevis type, Grinnell Fig. 260.
3. Wall support shall be welded steel bracket with wrought steel clamp Grinnell Fig. 194, 195 or 199 as required, or approved equal.
4. Vertical support for plumbing piping shall be carbon steel riser clamp, Grinnell Fig. 261, or approved equal. Use Grinnell Fig. CT-121 carbon steel with copper finish for copper pipe.
5. Floor supports for plumbing piping, shall be cast iron adjustable pipe saddles, lock nut, nipple, floor flange and concrete pier or steel support, Grinnell fig. 264, or approved equal.
6. Hangers for piping which is insulated with fiberglass insulation shall be installed on exterior of insulation.
7. Support vertical pipes at each floor level and at each coupling or union, using riser clamps which are supported by the floor.
8. Provide copper plated hangers and supports for copper piping which is not insulated.
9. Place hangers within 12" of each horizontal elbow.
10. Hanger shall attach to purlins with Sammy in side of purlin. Do not drill hole or hang from flange at bottom of purlin.

2.3.4 Hangers shall be secured to approved inserts where possible and practicable. Expansion shields may be used in special cases only. Spacing of the hangers shall not exceed ten feet for pipe 1-1/4" and larger and eight feet for pipe smaller than 1-1/4", except PVC Schedule 40 pipe which shall have hangers spaced not over 5 feet apart and located near a hub, and copper tubing which shall have hangers spaced not over 6 feet apart. Chain, strap perforated bar, or wire hangers will not be permitted.

2.3.5 Hanger rods shall be sized as follows:

<u>Pipe Size</u>	<u>Rod Diameter</u>
1/2" to 2"	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"

At the contractor's option, trapeze hangers may be used where parallel runs of pipe occur. All rods on trapeze hangers to be 1/2" minimum.

2.3.6 Trapeze hanger shall be constructed from 12 gauge roll formed ASTM A1011 SS Gr.33 structural steel channel, 1-5/8" x 1-5/8" minimum, B-line series B22 strut or stronger as required.

1. Mount pipes to trapeze with two piece pipe straps sized for outside diameter of pipe, B-line series B2000 series.
2. For pipes subjected to axial movement:
 - a. Strut mounted roller, support, B-line series B3126. Use pipe protection shield or saddles on insulated lines.
 - b. Strut mounted pipe guide, B-line series B2417.
3. All rods on trapeze hangers shall be 1/2" minimum.
4. Install sheet metal saddles under pipe insulation.

2.4 VALVES

2.4.1 All valves, fittings and other piping specialties, either as shown or required in the connection of the mechanical system or systems, except as may be otherwise specified elsewhere in these specifications, shall be Crane, Nibco, Nordstrom, or Milwaukee.

2.4.2 Threaded bronze ball valves shall be the "primary use" valve for domestic water service and branch isolation. Lubricated plug valves and ball valves shall be used for balancing. Do not use globe valves except where specifically indicated. All valves shall be threaded; sweat valves must be approved by Engineer and no sweat valves larger than 3/4" will be accepted. Install union with every valve. Do not install adaptor fitting in valve prior to soldering. Any valve which indicates direct heat was applied will be replaced.

<u>TYPE</u>	<u>SIZE RANGE</u>	<u>NUMBER</u>
<u>Domestic Water</u>		
Ball	2" & smaller (Threaded)	NIBCO NL 999X8 (Lead-Free/Full Port)
Ball	2 1/2" & 3" (Threaded)	NIBCO NL 998XE (Lead-Free/Full Port)
Gate	4" & larger (Flanged)	NIBCO F-607-RW (Epoxy coated)
Globe	2" & smaller	NIBCO T-235-Y
Globe	2 1/2" & larger	NIBCO F-718-B
Check	2" & smaller	NIBCO T-433-B
Check	2 1/2" & larger	NIBCO T-918-B
<u>Gas</u>		
Plug	3" & smaller	Nordstrom 114
Plug	4" & larger	Nordstrom 115
Ball	1/2" & 3/4"	A.Y. McDonald 10710 low
	(interior only)	pressure ball valve with handle
Plug	1" to 2"	A.Y. McDonald 10596 flat/T-head iron
	(interior only)	bronze body with check, FNPT thread
Plug	exterior (accessible to public)	A.Y. McDonald 10685B flat/T-head iron
		body plug valve with check stop
		(-20F to 150F)
Ball	exterior (roof)	Apollo 94A full port ball valve (0F-400F)
Plug	2-1/2" & larger	Nordstrom 142
Plug	(below grade)	Milliken 171M/201M (flange)
<u>Compressed Air</u>		
Ball	2" & smaller (Threaded)	Apollo 94A with yellow handle

2.4.3 Valve identification: Valves, regardless of size, shall have brass or plastic tags at least 1-1/2" in diameter. Legend shall be scheduled to conform to tag and shall include function of the valve, normal position, fluid conveyed and other pertinent data. A framed or laminated legend shall be posted adjacent to valve header or nearest Mechanical Room. Document valve locations on set of as-builts. Note: Valves where the function is obvious to the user are not required to be labeled (i.e. water heater isolation valves).

2.5 CLEANOUTS

2.5.1 General: Furnish and install cleanouts where indicated on plans or as required by local and state codes. Verify floor finish from Architectural schedule. Wall cleanouts shall be connected to PVC waste piping with Fernco flexible coupling and stainless steel clamps.

1. Wall cleanouts: Wade W-8560-E cleanout tee complete with stainless steel access cover and securing screw. Plug shall be countersunk brass with tapping for securing screw.
2. Floor cleanout: (VA tile floor, ceramic tile and concrete) Wade W-6000 Series (model per pipe size) round cast iron floor cleanout with threaded adjustable housing ferrule with plug, inverted Ty-Seal hub connection and secured nickel bronze cover. See Architectural finish schedules for areas required.

2.6 TRAPS AND DRAINS

2.6.1 P-traps shall be placed under all floor drains, and all plumbing fixtures without integral traps. All traps installed below grade shall be Schedule 40 PVC-DWV with deep seal.

2.6.2 Drains shall be Wade, or approved equal, in accordance with the schedule on the Drawings. Sizes and locations shall be as indicated on the Drawings. PVC body floor drains are not approved.

2.7 PLUMBING FIXTURES

2.7.1 Furnish and install complete, American Standard, Kohler or Sloan plumbing fixtures as scheduled on drawings. Handicapped lavatories and sinks with exposed hot supply and waste shall be insulated as stated in Paragraph 3.2.2. Kohler Bardon and Sloan SU-1006 urinals shall be considered as equal to American Standard Washbrook urinal.

2.8 COMPRESSED AIR OUTLETS

2.8.1 Brass, threaded with 1/8 inch National Taper male pipe threads for connection to female quick-coupler. Fasten each outlet securely and cap or plug for protection until final connection is made. Provide permanent, metal or plastic, identification plates securely fastened at each outlet opening. Identification plates shall have inscription "COMPRESSED AIR" with white letters embossed on blue, baked-on enamel background.

2.9 PRESSURE GAGES

2.9.1 Shall be 1/4 inch pipe size, manufactured expressly for compressed air service and marked 0-160 psig pressure range.

2.10 AIR PRESSURE REDUCING VALVE

2.10.1 Under 3 inch, bronze body and trim, single seated for dead-end service for 5 to 150psi range on low pressure side. Composition diaphragm and bronze spring to sit directly on valve stem. Delivered pressure shall vary not more than one psi for each 10psi variation in inlet pressure.

2.11 AIR COMPRESSOR

2.11.1 RAC-1: Air compressor system.

1. Air-Cooled Rotary Screw Compressed Air System

- a. One (1) Quincy Model OGS-10 10 HP air compressor mounted on a 120 gallon horizontal ASME coded air receiver with refrigerated air dryer, 10HP/208 volt/3-phase. Rated for 35.4 CFM @ 150 PSI discharge pressure (pressure change kit). Shall be furnished with Infologic2 connect controller, 8,000 hours synthetic fluid, low sound enclosure, tropical thermostat, oil heater and 5 year warranty. The dryer (120V) will give a 39 degree F pressure dew point for 35 scfm compressed air.

PART THREE - EXECUTION

3.1 PIPING INSTALLATION

3.1.1 Pipe cutting:

3.1.1.1 Pipes shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All piping after cutting and before threading shall be reamed and have all burrs removed and shall be cleaned before installation. Nipples shall be of the same material and composition as the adjacent pipe and shall be extra heavy when unthreaded shoulder is less than one inch. No all thread nipples will be allowed.

3.1.2 Piping layout:

3.1.2.1 Exposed lines shall be run parallel with, or perpendicular to, building line and wherever possible shall be grouped together for easier service and identification. Sanitary, waste, and similar lines which require a definite grade for drainage, shall be given precedence in routing over all other lines. Whenever possible, horizontal and vertical runs shall be held as close as possible to the walls, ceilings, struts, members, etc., so as to occupy the minimum space consistent with the proper requirements for insulation, expansion, removal of pipe and access to valves, dampers, etc. All concealed work shall finish off within the limits permitted by the vertical or horizontal chases. This Contractor shall take note of the Architectural and structural features of the building, shall provide for the concealment of all piping in finished areas of the building, and the placement of piping as indicated within the concrete framing system sections.

3.1.2.2 Horizontal soil and waste pipes shall be given an even grade of 1/4 inch per foot where possible, but piping 4" and larger may be run at 1/8 inch per foot. All main vertical soil and waste stacks shall be installed with provisions for expansion and shall be extended full size to and above the roof line as vents, except where otherwise specifically indicated. Horizontal offsets in all sanitary and waste pipe shall be accomplished with one sixteenth (1/16), one eighth (1/8) or one sixth (1/6) bends, with preference given to the order named. Horizontal intersections shall be accomplished with forty-five (45) degree or sixty (60) degree "Y" branches, or combination "Y" and eighth bends with preference given to the order named. Sanitary tees or crosses may be used on vertical lines for fixture connections. Use string line or laser method to grade all sewer lines. No exceptions.

3.1.3 Pipe assembly, domestic water, and gas:

3.1.3.1 All screws joints shall be made with tapered threads properly cut and shall be made perfectly tight with a stiff mixture of graphite and oil, applied with a brush to the pipe threads only, and in no case to the fittings. Caulking screwed joints will not be allowed.

3.1.3.2 Type "K" copper pipe joints shall be made up with the use of "Silfos" solder. Type "L" joints shall be made up using 95/5 solder and a suitable flux. Pipe ends shall be cut square, reamed to remove all burrs and cleaned bright with fine sandpaper and steel wool. Solder shall take up by capillary action and joint shall be made tight without a built-up head. Pulled tees are not acceptable.

3.1.3.3 Soldered joints observed by Engineer and found not acceptable shall be cleaned and resoldered at no additional cost to Owner.

3.1.3.4 Insulating couplings: Provide wrapped insulating couplings at all connections between galvanized steel pipe and copper pipe.

3.1.4 Pipe assembly, sanitary waste and vent:

3.1.4.1 Gasketed Polyvinyl Chloride (PVC) sewer pipe joints shall be assembled per manufacturer's joint assembly procedures. Only the manufacturer's gasket lubricant shall be used. All surfaces of the joint components shall be clean and dry. Use normal force to insert spigot. Contractor may use pipe puller or bucking bar if necessary; however, backhoe is not acceptable.

3.1.4.2 Glued Polyvinyl Chloride (PVC): Schedule 40 PVC fittings shall be solvent welded with schedule 40 PVC cement for 2" diameter or less and schedule 80 PVC cement for piping larger than 2". Surfaces shall be primed with tetrahydrofuran (THF). Primer shall leave purple residue to indicate the joints were primed. Never use a "dauber" type applicator for piping larger than 2", only natural bristle brush or roller shall be used (2" to 3" width). Use miterbox saw for cutting pipe square and de-bur end before inserting into fitting.

3.1.5 Penetration Wall/Floor Firestop:

3.1.5.1 In walls or floors which are designated as fire or smoke walls, the pipes which pass through, into or out of shall be protected with a UL approved system as specified by 3M Fire Protection Products or approved equal manufacturer. Fire proofing method shall be submitted to and approved by Architect.

3.1.5.2 Coordinate penetrations of fire walls, assemblies, barriers, etc. with architectural drawings.

3.1.6 Cold water piping, general:

3.1.6.1 This system shall consist of cold water piping as shown on the drawings including distribution and connection to every fixture furnished, installed, or connected under this contract.

- a. Isolation valves shall be provided for each group of fixtures and each separate riser. Valves shall be located in accessible locations and grouped together for ready maintenance and service. Provide Milcor access panels with hinged door where valves are concealed. Doors shall be located so they may be opened without obstruction. Do not locate behind water closets.
- b. Provide maintenance free manufactured arrestors for prevention of water hammer.

3.1.7 Hot water piping, general:

3.1.7.1 This system shall consist of hot water piping from domestic water heaters with connections to fixtures where indicated on the plans and/or risers and/or schedules. General Piping requirements same as cold water.

- a. Hot water piping is never run below grade or under concrete floors unless specifically indicated. (See Insulation Specifications 3.2).
- b. Furnish all check valves, isolation valves, gauges and piping as indicated.

3.1.8 Gas piping, general:

3.1.8.1 Provide full size dirtlegs at all low points of the system and at each appliance.

3.1.8.2 Provide a gas cock, union and appliance regulator at each gas using appliance.

3.1.9 Pipe identification:

3.1.9.1 All pipe located in accessible areas (lay-in ceilings included) shall be labeled, color coded, and have direction of flow indicated per ANSI A13.1-1981. Labels shall be located every 25 feet on horizontal runs; at each passage through wall, floor or ceiling; at each branch or riser takeoff.

3.1.9.2 The following lines shall be labeled:

- | | |
|----------------|-------------------|
| 1. Hot Water | 2. Cold Water |
| 3. Natural Gas | 4. Compressed Air |

3.1.9.3 Labels shall be equal to Seton Opti-Code Pipe Marker System. Secure to pipe with "Arrows-On-A-Roll" tape on both ends of label.

Compressed Air – Blue with white letters
Natural Gas – Yellow with black letters
Cold Water – Green with white letters
Hot Water – Yellow with black letters

3.2 INSULATION

3.2.1 After satisfactory tests upon the piping systems have been made as herein specified and after the systems have been thoroughly cleaned, the following insulation shall be installed by a skilled workman who has several years insulating experience.

Upon inspection, Architect reserves the right to demand an insulation contractor, at the contractor's expense, who specializes in the trade to rework or complete any insulation work which is unacceptable to trade standards and/or meet the intent of these specifications.

3.2.2 Insulation shall be Owens/Corning Fiberglass 23 ASJ/SSL, all service jacket, self-sealing lap, thickness specified.

- a. The specification covers the materials required for insulation of plumbing and piping and the general methods of installing this material. The application of all insulation shall be in accordance with the manufacturer's published recommendations and by mechanics regularly employed in this trade only. All piping, fittings, valves and equipment which may be subject to sweating and/or high surface temperatures shall be insulated.
- b. Insulation shall be of the highest grade and installed in accordance with National Commercial and Industrial Insulation Standards and these specifications. Surfaces of insulation shall be smooth and even with jackets drawn tightly and smoothly cemented down at all longitudinal and end laps. Cement shall be resistant to vermin and mold and shall be durable. No scrap pieces of insulation will be used where a full length section will fit. Pipe insulation shall be secured with aluminum bands, three per section or staples in addition to the adhesive. Insulation, including finishes and adhesives on the exterior surfaces of ducts, pipes and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 150 or less as determined by an independent testing laboratory in accordance with ASTM Standard #84.
- c. All surfaces must be clean and dry when insulation is installed. All foreign matter such as rust, scale, dirt, etc., shall be removed. Insulation shall be free of foreign matter and shall be dry when installed and before and during the application of any finish. The insulation may be installed at any time the contractor desires after the cleaning and painting specified in other sections of this Specification have been completed. However, installation of insulation before the piping, etc., has been tested and approved shall be at the risk of the Contractor and should defects in insulated work develop at or before the time of inspection and tests, insulation shall be removed and, after defects have been corrected, shall be reinstalled without expense to the Owner.
- d. Hangers for piping which is insulated with fiberglass insulation shall be installed on exterior of insulation. Piping 1-1/2" and larger shall contain a high density insulation "Foamglas" between the pipe and the hanger saddle to prevent crushing of the insulation. A wood block or wood dowel insert may be used in lieu of "Foamglas". All piping shall be provided with a 16-gauge galvanized sheet metal saddle between the fiberglass or "Foamglas" insulation and the hanger. Length of sleeve shall be two (2) inches longer than "Foamglas" section or a minimum of twelve (12) inches. Length of "Foamglas" shall be at least three (3) times the nominal pipe diameter or a minimum length of twelve (12) inches.
- e. Insulate all above grade hot and cold water lines with fiberglass sectional pipe insulation having a factory applied all service vapor barrier jacket ASJ/SSL. Water piping shall be insulated with thickness as tabulated below. Apply insulation to clean, dry piping with all joints tightly butted. Apply 3 (three) inch wide butt joint strips over all end joints. Insulate all fittings on piping up to 3 (three) inches IPS with insulating cement and on larger sizes with molded fittings or mitered segments to the same thickness as the adjacent insulation vapor seal with two 1/8" wet coats of Vapor Barrier Mastic reinforced with Glass Fabric extending two (2) inches into the adjacent insulation. Each change in direction of piping 1" and larger shall have a factory molded "Zeston" PVC fitting with internal insulation.

MINIMUM PIPE INSULATION						
INSULATION THICKNESS FOR PIPE SIZES						
COLD WATER LINES		0.5" THICKNESS				
Service Water Heating Temperature	Noncirculating runouts 3/4" and less not exceeding 12 ft. in length	Circulating Main & Runouts (see note)				
		PIPE SIZES				
		Up to 1-1/4"	1-1/2-2"	2"	2-1/2"	3"
100-180°F	0.5"	1.0"	1.5"	2.0"	2.5"	3.0"

*Nominal iron pipe size and insulation thickness.

- f. Fiberglass insulation shall not be installed where exposed to the elements. Water piping installed in block walls may be insulated with cellular foam equal to Armstrong Armaflex to allow installation prior to getting the building in the dry. All joints and seams shall be completely sealed.
- g. All water and drain lines shall be insulated below handicapped lavatories and sinks where exposed in knee space area with "P" trap cover, waste arm valve/supply covers and tailpiece cover. Protective pipe covers shall be as manufactured by Truebro, Inc. 100 Series for cast p-traps.

3.3 CROSS CONNECTIONS

3.3.1 No plumbing fixtures, device, or piping shall be installed which will provide a cross connection or interconnection between the water supply system for drinking or domestic purpose and a polluted supply or a soil or waste pipe which will permit or make possible the back flow of sewage, polluted water, or waste into the water supply system.

3.4 TESTING

3.4.1 General: All piping and other mechanical systems provided under this contract shall be tested by the contractor and approved by the Architect before acceptance. All piping located underground shall be tested by the contractor and observed by the Architect and local utility representative before backfilling. All equipment, fuel, water, electricity and personnel required for tests shall be furnished by the contractor without additional cost to the Owner. Testing equipment shall be required for the particular test and all equipment and gauges shall be accurate and in good working order. All equipment subject to damage if given test pressures shall be removed from line before pressure is applied. When tests have been completed, before pipe is covered contractor shall notify Architect for his observation.

3.4.2 Drainage system: The drainage systems shall have all necessary openings plugged to permit the entire system to be filled with water to the level of the highest stack above the roof (10 ft. minimum). The system shall hold this water for a minimum of 15 minutes before inspection of joints. All leaks shall be repaired and the system retested and proved tight before any fixtures are connected. The Contractor shall make any other tests which may be required under the local codes. System may be sectionalized with Architects approval if necessary to construction schedule. Pressure testing is permitted when using cast iron piping only.

3.4.3 Building sewer: The sewer from the building to a manhole or main shall be plugged at the point of connection to manhole or public sewer, filled with water and observed for leakage. The system shall be tight at all points.

3.4.4 Building domestic water system: The water piping system shall be tested under a hydrostatic pressure of 100 p.s.i. applied for one hour and proved tight and free from leaks. Where water piping is located other than in vertical pipe chases, the test shall be extended to 24 hours.

3.4.5 Natural gas system:

3.4.5.1 Each segment of piping intended to be operated at pressure of less than 1 psig shall be given a leak test at a pressure of 25 psig for a period of 15 minutes without any drop in pressure. Use 3 inch gauge with 100 psig maximum scale.

3.4.6 Compressed Air System: Cap and fill general-service compressed air piping with oil-free dry air or gaseous nitrogen to pressure of to psig above system operating pressure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure. Repair leaks and retest until no leaks exist.

3.5 STERILIZATION

3.5.1 Domestic water piping systems:

3.5.1.1 The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlet.

3.5.1.2 The entire domestic hot and cold water piping systems shall be thoroughly sterilized with a water/chlorine solution containing at least 50 parts per million (50 mg/L) of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million (200 mg/L) of chlorine and allowed to stand for 3 hours. After sterilization, the solution shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 part per million, unless otherwise directed, to satisfy all requirements of the Arkansas State Plumbing Code, Section 610. Contractor shall furnish a letter of compliance to the Architect.

3.6 CERTIFICATE OF INSPECTION

3.6.1 This contractor shall furnish to the Architect in duplicate a certificate of inspection issued by the plumbing division of the Arkansas State Health Department and shall also bear the expense for all inspection fees, etc.

3.7 PLUMBING FIXTURES AND EQUIPMENT

3.7.1 Plumbing fixtures shall be furnished and installed complete with all trimmings, escutcheons, and fittings unless otherwise specified under this item. Fixtures shall have smooth impervious surfaces free from defects and concealed fouling surfaces. Generally, all fixtures except water closets and urinals shall have the water supply above the rim. Fixtures with the supply discharge below the rim shall be equipped with backflow preventers. Angle stops, straight stops, stops integral with the faucets, or concealed type of lock-shield loose-key pattern stops for concealed supplies shall be furnished and installed with all fixtures. Exposed traps and supply pipes for all fixtures and equipment shall be connected to the rough piping system at the wall unless otherwise specified under this item. All fixtures and trimmings shall be designed to prevent the backflow of polluted water into the water supply system.

3.7.2 Fixture connections: Connections between earthenware fixtures and flanges on soil pipe shall be made absolutely gas tight and watertight with a high quality closet setting compound or with gaskets. Rubber gaskets or putty will not be permitted. Closet bolts shall be not less than 1/4" in diameter and equipped with brass nuts and washers covered with chromium caps unless otherwise specified. Fixtures and outlet flanges shall be set the proper distance from floor or wall to make a first class joint with the closet setting compound or gasket and fixture. No fixtures shall be set in place until the Architect has examined and approved such flange. All exposed piping, fittings, and trim shall be heavily chromium plated. Caulk around all water closets, lavatories, urinals and service sinks with latex caulk and finish shall be concave and smooth.

3.7.3 Fixture and equipment supports and fastenings: All fixtures and equipment shall be supported and fastened in a satisfactory and workmanlike manner. Where secured to concrete or brick walls, they shall be fastened with brass bolts or machine screws in lead sleeve type anchorage units or with 1/4" brass expansion bolts. Expansion bolts shall be of sufficient length to extend at least 3" into solid concrete or brick work. Where secured to terra cotta walls or partitions, fixtures shall be fastened with 1/4" brass toggle or through bolts. Where wood screws are used, screws shall go into solid wood, such as wood inserts, floor joists, studs, or solid pieces set between studs. Where through bolts are used, they shall be concealed by plaster. Bolts and nuts shall be hexagon and exposed bolts, nuts, cap nuts, and screws shall be chromium plated and shall be provided with chromium plated brass washers.

3.8 EXCAVATING AND TRENCHING FOR PIPING

3.8.1 Excavate to the depths indicated on the Drawings or as otherwise specified. Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulating therein shall be removed by pumping or by other approved method. Do sheeting and shoring as may be necessary for protection of the work and for safety of personnel. Excavation shall be by open cut except that short sections of a trench may be tunneled if the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.

3.8.2 Trench excavation: Bottom of trench for sewer and water pipe shall be rounded so that at least the bottom quadrant of the pipe rests firmly on undisturbed soil for as nearly the full length of the barrel as proper jointing operations will permit. Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil. Where rock is encountered, excavate to a minimum overdepth of 4" below trench depths indicated on the drawings or specified. Overdepths in rock excavation and unauthorized overdepths shall be backfilled. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered, such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.

3.9 BACKFILLING OF TRENCHES

3.9.1 Trenches shall not be backfilled until required pressure and other tests have been performed, inspection by utility and Code officials have been accomplished, and until the utilities systems as installed conform to requirements of Drawings and Specifications.

3.9.2 Backfill trenches with excavated materials consisting of earth, sandy clay, clayey sand, or other approved impervious materials, free from clods of earth or stones over 2-1/2" maximum dimension, deposited in 6" layers and compacted in accordance with the compaction procedures outlined in Section 31 22 00 –Grading. Tests for maximum density will be made with expense borne by Contractor. If fills fail to meet the specified densities, the Contractor shall remove and recompact the fill until specified densities are achieved.

3.10 CUTTING AND PATCHING

3.10.1 This Contractor shall do all cutting and patching made necessary by this work, but in no case shall be cut through or into any structural member without written permission from the Architects. This Contractor shall furnish and pay for the installation of all sleeves required for his work.

3.11 DEFECTIVE WORK

3.11.1 If inspections or tests show defects such defective work or material shall be replaced and inspection and tests repeated. All repairs shall be made with new material. Caulking of screwed joints or holes in piping work will not be acceptable. Floor drains that do not have a floor slope to the strainer shall be removed and reset with slope at no additional charge.

3.12 CLEANUP

3.12.1 When the Contractor's part of the work is finished, he shall remove from the premises all tools, machinery, debris, etc., and shall leave the premises free from all obstructions.

3.13 GUARANTEE

3.13.1 This Contractor shall furnish a written certificate, guaranteeing all materials, equipment, and labor furnished by him to be free of all defects for a period of one (1) year from and after, the date of final acceptance of the work by the Owner, and this Contractor shall further guarantee that if any defects appear within the stipulated guaranty period, such work shall be replaced without charge.

3.13.2 This guarantee shall be extended to include the capacity and integrated performance of the component parts of the various systems, in strict accordance with the true intent and purpose of the specifications. The Contractor shall conduct such tests as are herein before specified, or as may be required by the Architects, to demonstrate the capacity and performance ability of the various systems and their component parts.

3.14 HANDICAPPED MOUNT HEIGHTS

3.14.1 Fixture heights shall be as follows unless noted otherwise in Fixture Schedule:

Urinals	17" AFF to rim
Lavatory	2'10" AFF to rim
Water Closet	17 3/4" AFF to top of seat
Drinking Fountain	42"/36" AFF to spout – Hi/Lo

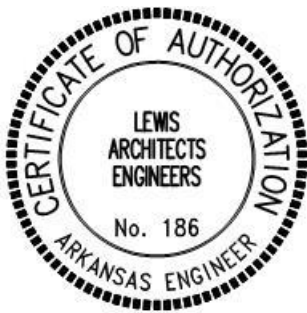
3.14.2 All handicapped fixtures to meet requirements of the Americans with Disabilities Act (ADA) 2010.

3.14.3 All water and drain lines shall be insulated on handicapped lavatories where exposed in knee space area. See paragraph 3.2.2.

END OF SECTION

The Engineer of Record for Industry Technology Renovation, Southern Arkansas University Tech, Camden, Arkansas Division 23 of the specifications.

October 23, 2025



HEATING, VENTILATION,
AND AIR CONDITIONING

PART ONE - GENERAL

1.1 DESCRIPTION

- 1.1.1 Work included: This specification includes the furnishing of all labor, materials, tools, equipment, drayage, rigging, fees, permits, etc., unless specifically furnished by others, necessary or reasonably required, for the complete installation and operation of all the work as herein specified and/or as shown on the Drawings. The entire work shall be delivered in a complete and perfect working order to the satisfaction of the Architect.
- 1.1.2 The scope of the work shall include the general listings as shown below in addition to which this contractor shall furnish and install all required pipe, fittings, valves, hangers, supports, sleeves, insets, traps, and other such equipment, items, and appurtenances as may be required for a complete and operative system or systems, including all parts auxiliary to the system or systems whether or not specifically set forth herein and/or shown on the Drawings.
- a. Systems of heating and air conditioning
 - b. Miscellaneous equipment and accessories
 - c. Tests, inspections, balancing and adjustment

1.2 APPLICABLE GENERAL SPECIFICATIONS AND REGULATIONS

- 1.2.1 The General Conditions, Supplementary Conditions, Instruction to Bidders and other pertinent documents, as issued by the Architect, are a part of these specifications and shall be complied with in every respect.
- 1.2.2 All Heating, Ventilation and Air Conditioning work and equipment, in whole or in part, shall conform to the applicable sections of the latest edition of the following ordinances, codes, and regulations which shall form a part of this specification.
- a. National Electrical Code
 - b. American Gas Association Recommended Practices
 - c. National Fire Protection Association Recommended Practice
 - d. Local, City and State Codes and Ordinances
 - e. American Society of Mechanical Engineers, Plumbing and Air Conditioning Codes
 - f. SMACNA

1.3 SUBMITTALS

- 1.3.1 The Contractor shall furnish electronic shop drawings using the submittal procedure as detailed in Section 01 33 23. Shop drawings are required even though the equipment is as specified.
- 1.3.2 All submittals must be on the manufacturer's standard certified submittal sheets or other approved sheets; faxed material will not be accepted. Each item must be marked with the symbol, letter, or number designating it in the specifications or on the plans and items must be arranged in the order specified or scheduled.

- 1.3.3 All performance data, details, dimensions, special features and accessories must be clearly marked.
- 1.3.4 Substitutions will not be considered without prior approval from the engineer.
- 1.3.5 Shop drawings are required even though the equipment is as specified.
- 1.3.6 Provide shop drawings on the following items:
- a. Heating and Cooling Equipment
 - b. Outside Air Equipment
 - c. Duct Insulation, Joint Sealant
 - d. Air Devices and Louvers
 - e. Manual Dampers
 - f. Exhaust Fans
 - g. Duct Takeoffs
 - h. Fabric Duct
 - i. All Accessories
- 1.3.7 If there are electrical revisions required due to substitute equipment, the Mechanical Contractor shall be responsible for any additional changes incurred by the Electrical Contractor.
- 1.3.8 When submitting substitute equipment with different rough-in requirements from the specified equipment, i.e. packaged unit ductwork openings, the Mechanical Contractor shall submit a sketch indicating the proposed installation for review by the Engineer. The Engineer may approve, revise or reject the proposal. If rejected, the Contractor shall provide the specified equipment or resubmit another approved substitute.
- 1.3.9 After shop drawings are approved, this contractor shall advise the General Contractor of any changes required in equipment supports and foundations and provide copies of shop drawings so that necessary provisions can be made.
- 1.3.10 Should a substitution be approved for use in lieu of that specified and should the substituted material prove defective or otherwise unsatisfactory, in the judgement of the engineer, for the service required within the guaranty period, the contractor shall replace the material or equipment as originally specified without additional cost to the Owner.
- 1.3.11 If submittals are "not approved" or marked "revise and resubmit", the complete package shall be corrected and returned for review. The contractor may provide a separate bound submittal which includes only the sections marked "not approved, or "revise and resubmit". Any additional submittal data requested shall also be provided in resubmittal.
- 1.4 COORDINATION
- 1.4.1 Chases, recesses and other openings in the building construction required for the location of pipes, or other, mechanical equipment, will be provided by the General Contractor. The mechanical Contractor shall advise the General Contractor of the sizes and locations, and furnish the necessary drawings in sufficient time to allow for provision of same; otherwise the additional cost caused thereby shall be paid by the mechanical contractor.

1.5 FEES AND PERMITS

- 1.5.1 Contractor shall pay for all fees, permits and charges for utility connections. This includes all fees required for improvement district non-refundable contribution.

1.6 OPERATION AND MAINTENANCE MANUALS

- 1.6.1 Refer to Section 01 77 19 – Contract Closeout for complete instructions.

1.7 CONTRACTOR REVISED DRAWINGS

- 1.7.1 The contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job. Exact location of all underground utility service entrances and their connections to utility mains as well as all valves, etc., which will be concealed in the finished work shall be accurately indicated on the drawings by measured distances. Upon completion of the work and prior to final payment, the contractor shall furnish to the Owner one set of "as-built" prints legibly and accurately marked to indicate all changes, additions, deletions, etc., from the Contract Drawings.

1.8 OPERATION AND MAINTENANCE INSTRUCTIONS

- 1.8.1 Provide complete operation and maintenance instructions on all equipment and instruct Owner's representative in their operation.

1.9 NAME PLATES

- 1.9.1 All mechanical equipment (furnaces, packaged units, condensing units, exhaust fans, etc.) shall be labeled with black and white laminated bakelite nameplates securely fastened to the device.
- Nameplate size shall be 1" x 2 1/2 " with beveled edges and 1/4" letters.
 - Nameplate shall have the equipment designation as noted on plans.
 - Nameplates shall be secured to equipment with rivets or sheetmetal screws.
 - Embossed stick back will not be allowed.
 - Nameplates for switches may be omitted for equipment where the disconnect is adjacent to the unit and is labeled by the Electrician.
 - Sample:



1.10 EQUIPMENT FURNISHED UNDER OTHER SECTIONS

- 1.10.1 This Contractor shall provide all necessary material and labor for the connection to the mechanical and electrical systems of all equipment requiring such connections, and which equipment is furnished by the Owner or is specified under other sections of these specifications. If any such equipment is not delivered prior to final acceptance, the services shall be capped or plugged at walls or floors as directed, and shall be left ready for future connection.

PART TWO - PRODUCTS

2.1 METAL DUCTWORK

- 2.1.1 Furnish and install all supply, return, outside air, exhaust and other ductwork shown, together with splitters, deflectors, dampers, etc. All work shall comply with all requirements of NFPA #90-A. All ductwork, supports, bracing, etc., shall be galvanized.
- 2.1.2 All galvanized ductwork shall be fabricated by using ASTM A90, A568, A653, and A924 commercial grade lock forming G-90/G-60 materials.
- 2.1.3 All material and gauges can be fabricated per SMACNA's construction standards based on system operating pressure.
- 2.1.4 Special duct construction materials such as 16 ga. steel, aluminum, stainless steel and spiral shall be as noted on drawings or other areas in this specification.
- 2.1.5 Refer to paragraph 3.1 – Air Distribution.
- 2.1.6 Air Devices:
- 2.1.6.1 Diffusers, Registers and Grilles: All diffusers, registers and grilles shall be E.H. Price, Titus or as specified on the plans. They shall fit tightly against the mounting surfaces and shall be equipped with felt or rubber gaskets and shall have frames to match the mounting surfaces. All registers, diffusers and exhaust registers shall have opposed blade dampers unless otherwise noted. All supply diffusers shall be insulated on back or top with a minimum of 1/2" thick fiberglass duct wrap.
- 2.1.6.2 Vanes: Furnish and install, at any change of direction, elbows with single thickness vanes. This applies to supply as well as return ducts. Radius elbows may be used in lieu of turning vanes for ducts less than 36" in width. Where sharp throat elbows are constructed a single turning vane shall be installed adjacent to the throat.

2.2 DUCT SUPPORTS

- 2.2.1 All materials shall be galvanized. Hangers shall be steel straps or rods and trapeze hangers, when concealed, on rods and trapeze hangers when exposed. Straps shall be connected to the duct with 2 sheet metal screws on side and one on the bottom. Spacing of hangers shall be 6' on center, or closer when necessary. Size of hangers for rectangular duct shall be:

Duct	Min. Rod	Strap	Trapeze
Up to 36"	1/4"	1" x 20 ga.	1-1/2" x 1-1/2" x 3/16"
37" to 60"	3/8"	1" x 16 ga.	1-1/2" x 1-1/2" x 3/16"
61" up	3/8"	1-1/2" x 12 ga.	2" x 2" x 1/4"

- 2.2.2 Duct passing through roofs shall be supported with galvanized steel-structural angles of adequate bearing surfaces and size for support.

2.2.3 Strap hangers used on externally insulated ductwork shall be installed loose around duct with 6" wide sheet metal saddle. Strap may be installed prior to insulation; however, strap penetration shall be sealed to maintain vapor barrier.

2.3 DUCT INSULATION

2.3.1 Furnish and install on all square and rectangular supply, and return air ducts, internally (unless otherwise noted), 1" thick, Owens/Corning type 150 duct liner. Exterior ducts internally lined shall be with 1 1/2" thick type 200 duct liner.

2.3.2 Round duct work shall be insulated externally with 2 3/16", 3/4 lb. fiberglass stapled 4" o.c. and seal seams and joints with 4" wide aluminum tape. Insulation for outside air ductwork may be 1-1/2" thick.

2.4 AUTOMATIC CONTROLS

2.4.1 Line voltage (120V) thermostats shall be equal to White Rodgers 1A66-641 for heating and 151-6 for cooling.

2.4.2 Provide complete submittal data with equipment submittal on wiring and interlock diagrams for controls.

2.4.3 Interlock wiring 120 volts or higher shall be installed by Electrical Contractor. Interlock wiring below 120 volts shall be by Mechanical Contractor. Refer to Section 26 05 00.

2.4.4 Low voltage control wiring from indoor air handling unit to exterior condensing unit shall be secured to insulated suction line with plastic cable ties. Apply protective coating on exterior refrigerant insulation prior to attaching control wiring. Provide 1/2" EMT in exterior wall or chase for routing of low voltage control wiring from interior to exterior.

2.4.5 Thermostats are to be mounted at 48" to top of box A.F.F.

2.4.6 Refer to equipment operational sequence on drawings.

2.4.7 Mechanical contractor shall furnish all magnetic motor starters to electrical contractor for installation. Single speed starters shall be equal to ITE Class "SXL" complete with overload thermal units, spare contacts as required. Nema 1 or 3R enclosure as required. Multi-speed starters shall be ITE S1 and S2 with enclosure as required. When automatic control system is specified, starters shall be HAND-OFF-AUTO switches with indicator lights.

2.4.8 Control of fan coil heat pump split systems (FC-1 and 2) shall be remote as provided by equipment supplier. Mount on wall as indicated on drawings.

2.5 CONDENSING FURNACE EXHAUST, CONDENSATE AND INTAKE PIPING AND FITTINGS

2.5.1 Piping and fittings shall be schedule 40 PVC conforming to ASTM D1785, D2466 and D2665. PVC primer and cement shall be per ASTM D2564.

2.5.2 Piping and fittings, including intake and exhaust piping terminations, shall be sized and installed in strict accordance with manufacturer's recommendation.

- 2.5.3 Exhaust piping shall be sloped back to furnace with a sufficient amount of hangers in order to prevent sagging and collecting of condensation. (Minimum 5 feet spacing).
- 2.5.4 When using a Wall Mounted Termination Kit, insert a No. 2 or 3 mesh painted galvanized hardware cloth bird screen inside exhaust opening of exterior or factory furnished screen.
- 2.5.5 Pipe hangers shall be carbon steel adjustable Clevis type, Grinnell Fig. 260 with all-thread rod to structure.
- 2.6 CONDENSATE LINES
 - 2.6.1 Condensate lines shall be Schedule 40 PVC (interior) and 80 PVC (exterior) with factory 90 degree elbows for deep traps on negative pressure drains and single piece shallow traps for positive pressure drains. Lines shall be vented, graded and securely anchored. Interior condensate drains which are condensing on the exterior surface after start up shall be insulated per cold water or refrigerant pipe insulation specification.
- 2.7 REFRIGERANT PIPING AND FITTINGS
 - 2.7.1 Furnish and install piping, provide refrigerant and test the piping. Refrigerant piping, including liquid and hot gas lines, shall be hard drawn copper, Type "L" pipe (degreased). Soft copper will be permitted when sleeving below grade or installing in wall to eliminate fittings. Soft copper may also be installed on units less than 1 1/2 tons.
 - 2.7.2 Joints shall be made with wrought copper fittings and silfos or copper pressure-seal fittings.
 - 2.7.2.1 Copper Pressure-Seal Fittings for Refrigerant Piping:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Rapid Locking System (RLS), LLC Press Fittings or comparable product approved by engineer.
 - 2. Fittings: UL 207 Listed: certified by UL for field installation. Certification as a UL-recognized component alone is unacceptable.
 - 3. Fitting Body: Refrigerant Grade Copper in accordance with ASTM B75 or ASTM B743.
 - 4. O-Rings: HNBR, or compatible with specific refrigerant.
 - a. Temperature Rating: Minus 40 deg F to plus 300 deg F (minus 40 deg C to plus 149 deg C).
 - 5. Maximum Continuous Operating Temperature: 250 deg F (121 deg C).
 - 6. Tools: Manufacturer's approved jaw(s) and tool.
 - a. Approved jaw's display two circular 360 deg (400 g) press bands, with circular groove to either side, along with a manufacturer's witness mark embossed on the bands.
 - 7. Maximum Allowable Working Pressure: In accordance with UL 207: 700 psig.
 - 8. Minimum Allowable Burst Pressure: In accordance with UL 207: 2100 psig.

- 2.7.3 All suction lines to be insulated with 3/4" Armaflex II pipe insulation. (Suction and liquid lines shall be insulated on ductless split systems.) Tubular insulation shall be slipped on to piping and sealed with Armstrong 520 adhesive. Insulate all valves, tees and other fittings with AP Armaflex insulation tape and secure in place with black plastic cable ties. If it is necessary to slit the tubular insulation because of specific construction requirements, insulation shall be sealed along entire length with Armstrong 520 adhesive and secured with plastic ties 12" o.c. All exterior insulation shall be thoroughly coated with weather resistant protective finish as manufactured by Armstrong. Finish is a water base latex enamel coating for use over all forms of Armaflex. Install finish prior to installation of insulation and touch up damaged areas after installation is complete. Secure control wiring, not in conduit, to suction line with plastic ties at 12" o.c.
- 2.7.4 Do not run refrigerant lines thru return air plenum unless approved by engineer.
- 2.7.5 Hangers shall be carbon steel light weight Clevis hangers equal to Grinnell Fig. 65 with all-thread rod to structure at 6'-0" maximum spacing. Suction and liquid lines can be supported by same hanger. Multiple lines in parallel shall be supported on unistrut trapeze hanger with all-threads to structure.
- 2.7.6 Moisture-Liquid Indicators: Forged brass, single port, removable cap, polished optical glass, solder connections, UL-listed, 200 degrees F (93 degrees C) temperature rating, 500 psi working pressure as manufactured by Sporlan Valve Company or Parker-Hannifin Corp.
- 2.7.7 Filter Driers: Sporlan HPC-100 Series Catch-All Liquid Line Dryer. Size per manufacturer's recommendation. Provide reversible type for heat pump applications. Driers shall be solid core desiccant.
- 2.7.8 Filter dryers and sight glasses are not required for ductless split systems.
- 2.8 MECHANICAL EQUIPMENT
- 2.8.1 All mechanical equipment shall be supplied as scheduled on plans. Substitutions must be approved in writing one week prior to bid date. No exception. All condensing units to have filter-drier, L.L. sight glass with moisture indicator, thermostatic expansion valve on coil, and crankcase heater.
- 2.9 MANUAL DAMPERS
- 2.9.1 Round dampers, unless integral to duct takeoff, shall be equal to Ruskin MDRS25, 20 ga. galvanized steel, 3/8" square axle shaft and molded synthetic bearings.
- 2.9.2 Rectangular dampers shall be equal to Ruskin MD25, 22 ga. galvanized steel 3/8" square axle shaft and molded synthetic bearings.
- 2.9.3 Provide lever handle operator with locking nut and mounting plate shown "OPEN" and "CLOSED" positions. Lever handle shall indicate damper position between open and closed. Lever handle shall be provided with a stand-off bracket to extend lever above external insulation where applicable. Shop fabricated dampers are not acceptable.

2.10 TAKE-OFF FITTINGS

- 2.10.1 Round supply take-off fittings shall be 45° transi fitting equal to Flexmaster Model STD with 1" wide mounting flange and adhesive coated gasket, damper, 3/8" square axle shaft, nylon bearings, quadrant indicator and 2" standoff bracket. Return and exhaust fittings shall be air-track gasketed type. All flanged/adhesive fittings shall be attached with sheet metal screws at 4" spacing around circumference of flange.

PART THREE - EXECUTION

3.1 AIR DISTRIBUTION

3.1.1 Metal Ductwork:

- A. Ducts shall be installed with special care and shall present a neat appearance. Plenum chambers shall be 22 gauge, reinforced with structural angles. Exterior ductwork and all exposed, rectangular interior ductwork shall have all joints made watertight equal to Ductmate 25/35/45 connection system with roll-formed flanges, corner pieces, gasket and cleat.
- B. All ducts with one side over 24 inches shall be cross broken for rigidity.
- C. All duct dimensions are outside dimensions.
- D. Flash and counter-flash all piping, ductwork, etc., penetrating walls and roof, using minimum 20 gauge galvanized steel, unless shown otherwise.
- E. Duct locations, sizes and proportions shown on the Drawings shall be followed as nearly as practicable. However, locations and width x height ratios of ducts may be changed a reasonable amount to fit the job conditions without additional cost to the Owner.
- F. All four (4) sides of return air plenums, excluding ceiling plenums, shall be completely lined with 1" duct-liner.
- G. Wall louvers shall be furnished to General Contractor for installation. This Contractor shall furnish and install ductwork and dampers behind louvers, as shown on the Drawings.
- H. Plastic duct tape shall not be used to hold joints together. Seal all joints in sheet metal supply, return and exhaust ductwork with "Hardcast" type DT sealing tape and type FTA adhesive, installed in strict accordance with manufacturer's instruction. Clean all dirt, oil, moisture, etc., before applying adhesive. At contractor's option, Hardcast Iron Grip IG-601, Foil Grip 1402 or Aluma Grip AFT-701 may be used on joints. However, if these products are substituted for DT mesh and adhesive, it is critical that the area of application is clean from dirt, oil, grease and moisture. Failure to do so will require reapplication of sealant. All joints on round duct to be screwed prior to sealant application. Seal all joints around equipment which permit leakage of conditioned air with Hardcast Foil Grip 1402.

- I. Flexible duct connections: On duct connections of air moving equipment greater than 2000 CFM or as required for equipment installation, provide 30 ounce woven glass fabric, double coated with neoprene "Ventglas", or equal, canvas connections to give no less than 3" clear break between metals jointed. Insulate with 1" minimum fiberglass duct wrap with a vapor barrier facing of foil reinforced kraft. Seal with reinforced aluminum tape. Flexible connections on exterior shall be protected from weather with sheetmetal cover which shall be coated for protection same as ductwork.
- J. Flexible duct runouts: Permitted only to provide final ceiling grille placement with length not to exceed 3'0". Flexible duct shall not be used to replace elbow at ceiling grille. Flexible ductwork shall have a trilaminate of aluminum foil, fiberglass and aluminized polyester inner liner which is mechanically locked without adhesives, a thick insulation blanket and a fire retardant reinforced aluminum outer jacket, as manufactured by Flexmaster Type 5M.
- K. Splitter dampers: Splitter dampers shall be furnished and installed at certain branches from main ducts and at certain elbow takeoffs to air outlets, where specifically shown on the Drawings.
- L. Damper adjusting devices: Each splitter or volume extractor, unless specified for automatic operation shall be fitted with an adjusting device having a locking mechanism of all galvanized construction.
- M. All ductwork penetrations thru masonry walls shall be sleeved, including cans at sidewall supply and return grilles. Penetrations thru fire rated walls shall be sleeved and dampered in accordance with NFPA 90A and UL555. All fire dampers shall be accessible thru duct mounted access doors. Grille and duct size shall be verified prior to sleeve size selection to allow clearance for duct, insulation and grille neck.

3.1.2 Duct insulation:

3.1.2.1 Application:

- A. Method 1: All ducts requiring insulation liner shall be lined by cutting pieces to fit snugly against the interior duct surfaces. The liner shall be fastened to the duct with a heavy coat of quick tacking rubber based adhesive spread over the entire duct surface. The top and bottom pieces are to lap the side piece and all exposed edges of the insulation at the duct ends shall be coated with adhesives. The heavy density surface shall face the air stream. The strength of Ultra-liner fiber assures positive attachment to adhesive and will not shear.
- B. Method 2: All ducts requiring insulation liner shall be lined by carefully adhering to the liner in a continuous piece to clean flat metal sheets with a quick-tacking rubber based adhesive and forming the liner with the metal through the brake. The smooth heavy density surface shall face the air stream.
- C. Method 3: All ducts over 24" in width or breadth shall be lined in accordance with Method 1 or Method 2 and in addition, the liner shall be secured with sheet metal screws and washers, or stud welded pins and clips.
- D. All transfer ducts shall be in a "U" configuration and fully insulated with grilles located on both ends of the duct.

3.1.3 Balancing and adjusting:

- A. Testing, adjusting and balancing (TAB) of the heating, ventilating and air conditioning system will be performed by an impartial National Environmental Balancing Bureau NEBB firm whose operations are limited to the field of professional TAB.
- B. The firm shall have operated a minimum of one year under its current firm name.
- C. The firm shall be capable of performing the service specified at the location of the facility described within the time specified, of preparing and submitting the detailed report of the actual field work performed, and following up the basic work as may be required.
- D. All air quantities shall, after completion of the job, be adjusted to provide air quantities shown on plans. After complete adjustment, additional readjustment shall be performed if necessary to satisfy desired temperature.
- E. The balance procedure shall include the checking of each supply, return, outside air, and exhaust fan. As a minimum, CFM, RPM and ampere readings shall be taken. Pulley adjustments, etc., shall be performed to obtain the required CFM readings.
- F. After all adjustments and corrections have been performed to balance system as designed and required, the Air Balance Subcontractor shall prepare and submit three (3) copies of completed balance form to Architect/Engineer for approval.
- G. At the time of balancing, the Air Balance Contractor's Technician shall verify that each device is the size and pattern submitted and includes accessories such as volume controls and deflectrols where specified.
- H. Prior to balancing, verify that filters have been recently replaced (if not, contact mechanical contractor for replacement). Packaged wall units have 1" filter grille as well as 2" filter inside unit.
- I. Check all systems for noise and vibration which may be objectionable.
- J. When Contractor is satisfied that all systems may be acceptable to the design engineer, the Contractor shall call for an inspection.
- K. Systems shall not be accepted until properly balanced.
- L. Air balance of each system shall be performed with air device dampers in full open position. Air adjustment shall be made at manual damper on runout duct.
- M. THE TAB REPORT
 - 1. All measurements and recorded readings (of all water, electricity, etc. that appear in the reports must be done on-site by the permanently employed technician or engineers of the firm.
 - 2. The report shall be certified and approved by the NEBB certified personnel for the firm. The report shall be provided in triplicate.

3. The TAB report shall include the following as a minimum:
- a. Preface: A general discussion of the system with an outline of normal and ventilation cycles of operation.
 - b. Pitot Tube Traverses: All exhaust ducts and main supply ducts, and return ducts will have air velocity and volume measured and recorded by the traverse method. Locations of these traverse test stations will be described on the sheet containing the data.
 - c. Temperature Tabulation: Of all conditioned spaces on a room-by-room basis. Record outside ambient temperature at two hour intervals. The total variation in conditioned space temperatures shall not exceed two degrees variance from the thermostat settings.
 - d. Air Volumes and Velocities: As measured at each supply grille, return air grille, and exhaust air grille or air handling device, it shall be the obligation of the Division 23 Contractor to furnish or revise fan drive and/or motors if necessary, without cost to the Owner, to obtain the specified air volumes.
 - e. Static Pressure Drops: As measured across each supply fan, cooling coil, heating coil, return air fan, air handling unit filter and exhaust fan.
 - f. Electrical Current/Voltage: Measurements to be taken at the drive motor on each piece of equipment.
 - g. Fan Speeds: To be measured in RPM.
 - h. Instrumentation List: A list of instruments by type and make used in gathering the TAB data.
 - i. Drawings:
 - 1) Mark a set of drawings to have the duct systems and supply air openings numbered and/or lettered to correspond to the numbers and letters used on the report.
 - 2) If room numbers actually used in the building differ from those on the plans, the final building room numbers shall be marked on the plans.

Only one such marked up set of drawings need to be provided with the two copies of the TAB report.

3.1.5 Grilles and registers:

3.1.5.1 Contractor shall refer to reflected ceiling plan for exact location of ceiling grilles and shall verify with Architect the exact location of all wall mounted registers and grilles.

3.1.5.2 Contractor shall thoroughly clean all grilles and registers prior to final inspection, and touch up all chipped or scratched units. Equipment with rust evident will be completely removed from job site and replaced with new equipment.

3.1.5.3 Contractor shall paint the duct and/or insulation flat black behind the face of the grilles.

3.1.6 Filters:

3.1.6.1 Provide filters for all air conditioning systems and permanent medium retainers and frames with access doors as required for easy access.

- A. Units must not be operated temporarily without filters. When the job is accepted, all used filters shall be replaced with clean, unused filters.

- B. Provide one (1) extra set of filters for each unit which does not have permanent filters to the Owner.
- C. Permanent filters shall not be used during construction.
- D. Provide temporary filter media over return air grilles during construction. If excessive dirt and dust is allowed to enter system as determined by the job inspector, the Contractor shall be responsible for cleaning ductwork, plenum and coils.

3.2 REFRIGERANT PIPING TESTING

- 3.2.1 Testing shall be done during progress of work or at completion to insure tight seams. Soap Test R-22 hot gas at 235 psi and liquid and suction lines at 300 PSI; R-500 liquid and suction lines at 245 PSI. Allow system to stand for 24 hours under pressure and, if no change in pressure, system may be considered tight.
- 3.2.2 Testing shall be done during progress of work or at completion to insure tight seams. Soap Test R-410A Suction and Liquid lines at 535 PSIG; R-407C Suction and Liquid lines at 380 PSIG. Allow system to stand for 24 hours under pressure and, if no change in pressure, system may be considered tight.
- 3.2.3 Before charging, evacuate the system to 0.15 inches of mercury absolute pressure. All pumps to operate at least four (4) hours at this reading.

3.3 GUARANTEE

- 3.3.1 This Contractor shall furnish a written certificate, guaranteeing all materials, equipment, and labor furnished by him to be free of all defects for a period of one (1) year from and after, the date of final acceptance of the work by the Owner, and this Contractor shall further guarantee that if any defects appear within the stipulated guaranty period, such work shall be replaced without charge.
- 3.3.2 This guarantee shall be extended to include the capacity and integrated performance of the component parts of the various systems, in strict accordance with the true intent and purpose of the specifications. The Contractor shall conduct such tests as are herein before specified, or as may be required by the Architect, to demonstrate the capacity and performance ability of the various systems and their component parts.

END OF SECTION

FABRIC AIR
DISTRIBUTION DEVICES

PART ONE - GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of non-metal ductwork is indicated on drawings and by requirements of this section.
- B. Types of non-metal ductwork required for this project include the following:
 - 1. Textile Air Dispersion Products.

1.2 QUALITY ASSURANCE

- A. Building Codes and Standards:
 - 1. Product must be Classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A and are also classified in accordance with ICC Evaluation Service AC167 and UL 2518.
 - 2. All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.
- B. Design & Quality Control
 - 1. Manufacturer must have documented design support information including duct sizing; vent, orifice, and/or nozzle location; vent, orifice, and/or nozzle sizing; length; and suspension. Parameters for design, including maximum air temperature, velocity, pressure and textile permeability, shall be considered and documented.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications on materials and manufactured products used for work of this section.
- B. Building Code Data: Submit UL file number under which product is Classified by Underwriter's Laboratories for both NFPA 90-A, ICC AC167, and UL 2518.
- C. Provide detailed drawings confirming configuration of Fabric Tensioning System (components, support locations, segment lengths) and Textile Dispersion System (diameter, lengths, airflow, pressure, and textile permeability).
- D. Provide detailed installation instructions for components to be installed.
- E. Provide warranty and maintenance documentation.

1.4 WARRANTY

- A. Manufacturer must provide a 10 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect textile air dispersion system and SkeleCore IHS components from damage during shipping, storage, and handling.
- B. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

PART TWO – PRODUCTS

2.1 MANUFACTURER

DuctSox® Corporation, or Architect approved equal.

2.2 TEXTILE AIR DISPERSION SYSTEM

- A. SkeleCore IHS (Internal Hoop System): Air diffusers shall be constructed with internal retention system.

- 1. System shall consist of an internal 360 degree hoop system, spaced 5' on center.
- 2. System shall be installed with a one row suspension system located 1.5" above top-dead-center of the textile system.
- 3. System attachment to cable shall be made using Gliders spaced 12 inches.
- 4. Available for diameters from 8" – 60".
 - a. One row suspension options
 - b. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
 - 1) Cable suspension options(must specify if multiple on same project)
 - (a) Galvanized steel cable
 - (b) Stainless steel cable
 - (c) Impregnated steel cable(required for natatorium applications)
 - 2) Support lengths available in 5'(standard), 10', 15', & 30'.

- B. TEXTILE

- 1. Verona
 - a. Textile Construction: Filament/filament twill polyester, fire retardant in accordance with UL 2518.
 - b. Air Permeability: 2 (+2/-1) CFM/ft² per ASTM D737, Frazier
 - c. Weight: 6.2 oz. /yd² per ASTM D3776
 - d. Warranty: 10 years with standard inlet velocity.
- 2. Textile Color
 - a. Standard: blue, white, tan, red, green, silver, black
 - b. Custom

C. TEXTILE SYSTEM FABRICATION REQUIREMENTS

1. Textile system to be constructed in modular lengths (zippered) with proper radial securing clips (inlets, endcaps, and mid-sections) and top access zippers for vertical cable safety attachment.
2. Integrated air dispersion shall be specified and approved by manufacturer. (select only those that apply).
 - a. Linear Vents
 - 1) Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting at 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.
 - 2) Size of vent openings and location of linear vents to be specified and approved by manufacturer.
 - 3) Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via zip screw fastener – supplied by contractor.
 - 4) Inlet connection includes zipper for easy removal / maintenance.
 - 5) Lengths to include required intermediate zippers as specified by manufacturer.
 - 6) System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.
 - 7) End cap includes zipper for easy maintenance.
 - 8) Each section of the textile shall include identification labels documenting order number, section diameter, section length, piece number, code certifications and other pertinent information.

D. DESIGN PARAMETERS

1. Textile air diffusers shall be designed from 0.25" water gage minimum to 3.1" maximum, with 0.5" as the standard.
2. Textile air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).
3. System overall design; diameter, length, airflow, operating static pressure and dispersion shall be designed or approved by the manufacturer.
4. Do not use textile diffusers in concealed locations.
5. Use textile air dispersion systems only for positive pressure air distribution components of the mechanical ventilation system.

PART THREE – INSTALLATION

3.1 INSTALLATION OF TEXTILE AIR DISPERSION SYSTEM

- A. Install chosen suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product.

3.2 CLEANING AND PROTECTION

- A. Clean air handling unit and ductwork prior to the fabric duct system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
- B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
- C. If fabric duct systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

END OF SECTION

The Engineer of Record for Industry Technology Renovation, Southern Arkansas University Tech, Camden, Arkansas Divisions 26 and 27 of the specifications.

October 23, 2025



COMMON WORK RESULTS
FOR ELECTRICAL

PART ONE – GENERAL

1.01 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division One Requirements.
- B. Work included: This specification includes the furnishing of all labor, materials, tools, equipment, drayage, rigging, fees, permits, etc., unless specifically furnished by others, necessary or reasonably required, for the complete installation and operation of all the work as herein specified or as shown on the Drawings. The entire work shall be delivered in a complete and perfect working order to the satisfaction of the Architect.
- C. The scope of the work shall include the general listings as shown below in addition to which this contractor shall furnish and install all required conduit, wire, fittings, boxes, connectors, hangers, supports, sleeves, poles, concrete bases and other such equipment, items, and appurtenances as may be required for a complete and operative system or systems, including all parts auxiliary to the system or systems whether or not specifically set forth herein and/or shown on the drawings.
- D. Extent of electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include, but not necessarily limited to, connections for providing electrical power to equipment.
- E. Types of electrical power connections specified in this section include the following:
 - 1. Distribution system.
 - 2. Branch circuits.
 - 3. Grounding.
 - 4. Disconnects.
 - 5. Circuit Breakers.
 - 6. Panelboards.
 - 7. To motors.
 - 8. From motor starters to motors.
 - 9. To lighting fixtures and receptacles.
 - 10. To converters, rectifiers, transformers, inverters, and similar current adjustment features of equipment.
 - 11. To ground.
 - 12. To owner furnished, contractor installed equipment.
 - 13. To master units of communication, signal alarm, and public address systems.
- F. Junction boxes and disconnect switches required for motors and other electrical units of equipment are specified in applicable Division 26 sections.
- G. Refer to sections of other Divisions for specific individual equipment power requirements.

1.02 Quality Assurance

- A. Manufacturers: Firms regularly engaged in manufacturing of electrical connectors and terminals, of types and ratings required, and ancillary connection materials, including electrical insulating tape, and cable ties, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical connection work similar to that required for project.
- C. NEC Compliance: Comply with applicable portions of NEC as to type projects used and installation of electrical power connections (terminals and splices), for junction boxes, motor starters, and disconnect switches.
- D. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to electrical connections for equipment.
- E. ANSI Compliance: Comply with applicable ANSI standards pertaining to products and installation of electrical connections.
- F. Labels: Provide electrical connection products and materials, which have been listed or labeled by a nationally recognized testing laboratory engaged in the testing, listing and labeling of electrical materials and equipment.

1.03 DRAWINGS:

- A. The Electrical Drawings show the general arrangement of all piping, equipment and appurtenances and shall be followed as closely as actual building construction and the work of other trades will permit. The work shall conform to the requirements shown on all of the drawings. General and Structural Drawings shall take precedence over Electrical Drawings. Because of the small scale of the Electrical Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, offsets, and accessories as may be required to meet such conditions.
- B. The intent of the electrical drawings and specifications is that the subcontractor shall furnish all labor and materials, equipment and transportation necessary for the proper execution of the work unless specifically noted otherwise. The work of this subcontractor as related to the other trades is shown in its majority on the drawings, but this subcontractor shall thoroughly examine the drawings and specifications relating to other trades in order to include all necessary work in his bid. No additional payments shall be considered for failure to properly interpret the responsibility to other trades. The subcontractor shall do all the work shown on the drawings and described in the specifications and all incidental work considered necessary to complete the work ready for use, occupancy, and operation by the Owner. The Architect reserves the right to make any reasonable changes in the locations indicated without cost to the Owner.
- C. If there be conflicting variance between the drawings and specifications, the provisions of the most stringent shall control. In case of conflict between the General Conditions of the Contract or any modifications thereof and the electrical specification, the electrical specification shall control.

1.04 REFERENCES

- A. The latest edition of specifications and standards of issues listed below but referred to thereafter by basic designation only, form a part of these specifications:
1. National Electrical Code.
 2. National Fire Protection Association's Recommended Practices.
 3. Local, City and State Codes and Ordinances.
 4. National Electrical Safety Code.
 5. Underwriter's Laboratories, Inc.
 6. Illumination Engineering Society.
 7. Institute of Electrical and Electronic Engineers.
 8. Insulated Power Cable Engineers Association.
 9. National Electrical Manufacturers Association.
 10. Seismic Code Section of the International Building Code.
 11. American Society for Testing Materials.
 12. Occupational Safety and Health Act.
 13. Service requirements of serving utility company.
 14. Americans with Disabilities Act. (ADA).
 15. ASHRAE/IESNA Standard 90.1.
- B. In case of difference between building codes, specifications, state laws, local ordinances, industry standards, and utility company regulations and the contract documents, the most stringent shall govern.
- C. Should any part of the drawings or specifications be found to be in conflict with applicable codes or ordinances, the contractor shall notify the Architect before submitting his bid. After entering into the contract, the Contractor shall complete all work necessary to meet the requirements of all codes or ordinances without additional expense to the Owner.
- D. Non-compliance: Should the subcontractor perform any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all cost arising from correcting the deficiencies.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Contractor shall provide shop drawings and required field drawings as required or instructed by the Architect. Deviation from the drawings and specifications shall be called to the attention of the Architect in writing at the time of submission of shop drawings. The Engineer's approval of any drawings shall not release the subcontractor from responsibility for such deviations. The subcontractor shall check the work described by the catalog data with the engineer's contract documents for deviation and errors. All shop drawings submitted shall bear signed certification that the Contractor has carefully checked shop drawings and found them to be correct and that they comply with plans and specifications. The Architect will not review any shop drawings which are not accompanied by this certification.

- C. Proposed Products List: Include Products specified in the following Sections:
1. Panelboards
 2. Lighting Fixtures
 3. Wiring Devices/Coverplates
 4. Wire/Cable
 5. Systems
- D. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. The basic information for each item of equipment to be included is as follows:
1. Index.
 2. Installation and operation Instructions
 - a. Individual tabbed sections.
 - b. Manufacturer descriptive literature.
 - c. Applicable control diagrams.
 - d. Composite wiring diagrams.
 3. Each submittal sheet shall be clearly marked with equipment Catalog Number and accessory items being submitted.

1.06 REGULATORY REQUIREMENTS

- A. Work shall conform to all applicable codes, specifications, local ordinances, industry standards and utility company regulations.
- B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The Contractor, in such cases, may at his option propose any article, approved equal to or better than that specified, as approved in writing by the Architect.
- C. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations.
- D. All required fees, permits and inspections shall be obtained and paid for by the contractor under the section of the specifications for which they are required.

1.07 UTILITY FEES AND REQUIREMENTS

- A. The Contractor shall obtain the consent of each serving utility company for the electrical and telecom service connections shown for the project. Each utility shall be requested by the Contractor to examine the contract documents and reply in writing their consent to service.
- B. The Contractor shall be responsible for coordinating and providing the exact service equipment and installation methods with the serving Utility prior to bidding. Failure to do so will not constitute sufficient grounds for an authorized change order to the project.
- C. Contractor shall furnish and install all conduit, wire, cabinets, weatherheads, etc., as required by local utility company for metering purposes. Contractor shall verify with utility the type, location, and general requirements for metering.

1.08 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions. The Architect/Owner reserves the right to relocate any device a maximum distance of 6'-0" at the time of installation without an extra cost being incurred.
- B. Locations and elevations of the various utilities, included within the scope of this work, have been obtained from utility maps and/or other substantially reliable sources and are offered separate from the contract documents as a general guide only, without guarantees as to accuracy. This Contractor shall examine the site and shall verify to his own satisfaction the location and elevation of all utilities and shall adequately inform himself of their relation to the work before entering into a contract.
- C. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.
- D. Inspection:
 - 1. The Contractor shall notify the Architect when the work reaches the following stages of construction, so that special inspection of the work may be accomplished prior to the covering up of these items:
 - a. All underground or under slab items in place and tested, but not covered.
 - b. Interior items prior to being concealed
 - c. Tests
 - 2. The Contractor shall give to the proper authorities all requisite notices relating to the work under his charge, shall afford all authorized inspectors every facility for inspection and all violations of the law shall be the responsibility of the Contractor.
 - 3. All materials and each part or detail of the electrical work shall be subject at all times to observation by the Engineer, and the Contractor shall be held strictly to the true intent of the electrical specifications in regard to quality of materials, workmanship, and the diligent execution of the contract. Such observation may include mill, plant, or shop. The engineer shall be allowed access to all parts of the work and shall be furnished with such assistance and information by the Contractor as is required to make a complete and detailed observation.

1.09 CONTRACTOR REVISED DRAWINGS

- A. The Contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job.
- B. Upon completion of the work and prior to final payment, the Contractor shall furnish to the Architect, one set of "contractor revised" reproduces, legibly and accurately marked to indicate all changes and additions.
- C. This Contractor shall visit the site of the building before submitting a proposal on this work, and shall thoroughly familiarize himself with the existing conditions and operations. Failure on his part to do this will not be cause of extras after the contract is signed, by reason of unforeseen conditions.

1.10 SHOP DRAWINGS

- A. The Contractor shall submit to the Architect for approval, a list of all equipment he proposes to furnish, together with descriptive literature, capacities, manufacturer's name, approximately delivery date and any other pertinent facts concerning the various items. The submittal shall consist of a tabulation of all items included, followed by catalog and data sheets, wiring diagrams, etc. Piecemeal submittals will be returned without consideration. Shop drawings are required even though the equipment is as specified. Refer to specification Section 01 33 23 – Shop Drawings, Product Data & Samples for submittal procedures.
- B. The equipment listed herein or on the drawings will be furnished as specified unless scheduled "or equal". If "or equal" is indicated, the product of any reputable manufacturer regularly engaged in the commercial production of the specified equipment will not be excluded on the basis of minor differences, provided all essential requirements of this specification relative to materials, limitations of available space for equipment, capacity, and performance are met. The Contractor shall be responsible for any and all additional costs required by modifications to architectural, structural, mechanical or electrical facilities, devices, systems, etc. resulting from the approved substitution.
- C. Wherever the substituted equipment actually furnished under these specifications requires the use of larger connections, more connections, or a different connection arrangement than indicated on the drawings or specified under these specifications, the Contractor shall furnish a scaled drawing showing how he proposes to install substituted equipment. Drawings shall show clearances and be coordinated with other mechanical and electrical equipment in the space. Should a substitution require the Architect or Engineer to provide additional services to accommodate it, the Contractor shall be responsible for costs incurred by the Architect or Engineer. Should a substitution be approved for use in lieu of that specified and should the substitute material prove defective or otherwise unsatisfactory, in judgement of the engineer, for the service required within the guaranty period, the contractor shall replace the material or equipment as originally specified without additional cost to the Owner.
- D. The subcontractor shall abide by the engineer's judgement when proposed substitute materials or items of equipment are judged to be unacceptable and shall furnish the specified material or item of equipment in such case. All proposals for substitution shall be submitted in writing by the General Contractor and not by the electrical subcontractor or material suppliers. The engineer will approve or disapprove proposed substitution in writing within a reasonable time and, if any request for a substitution is rejected, the Contractor shall automatically furnish material specified. No substitute materials shall be used unless approved in writing.
- E. Electrical Distribution Equipment submittals must be typewritten and factory approved. Long hand submittals and field sketches will not be accepted. Submittals shall indicate proper numbering sequence of all circuit breakers. Submittals not reflecting the sequence will be returned without further consideration.
- F. The Contractor shall submit shop drawings to the Architect in accordance with the schedule prepared by the General Contractor but not later than 30 calendar days after the date of the agreement. Failure to submit shop drawings within 30 days, shall disqualify the Contractor from substituting specified equipment.

- G. If submittals are "not approved" or marked "revise and resubmit", the complete package must be corrected and returned for review. Partial submittals, including only the items not approved, are not acceptable.
- H. The contractor shall not install any equipment or materials until the shop drawings for the equipment or materials have been approved.

1.11 INSTRUCTIONS OF OWNER'S REPRESENTATIVE: The Contractor shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical and electrical systems. A competent representative of the Contractor shall spend sufficient time in such formal instruction to fully prepare the Owner to operate and maintain the Electrical Systems.

1.12 OPERATING AND MAINTENANCE MANUALS

- A. After approval of materials and equipment for use in this project, a copy of an Operation and Maintenance Manual shall be submitted for approval.
- B. The basic information for each item of equipment to be included is as follows:
 - 1. Index
 - 2. Maintenance and operating instructions
 - a. Manufacturer's descriptive literature and maintenance manuals
 - b. An approved set of shop drawings
 - c. Applicable control diagrams
 - d. Performance curves and rating data
 - e. Composite wiring diagrams as applicable showing all motor controllers, relays, etc., with interlocking provisions as built in the job, along with a written description of the control sequence if applicable
 - f. Spare parts list (when parts are provided)
 - g. Listing of part suppliers and their addresses
 - h. Single line diagram of the "as-built" building electrical distribution system. This diagram shall indicate the locations of the check-metering access points as required by ASHRAE/IESNA.
 - i. A transformer loss calculation estimate of each transformer installed on the project if the total capacity of all transformers utilized exceeds 300 KVA in accordance with ASHRAE/IESNA.
 - j. Submit fire alarm system components inspection testing forms and system certification forms as required by NFPA 72.
- C. Upon final approval, submit one (1) bound copy of the approved Operation and Maintenance Manual to the Architect and hold two (2) copies for instruction of Owner as hereinafter specified.

1.13 GUARANTEE

- A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.

- B. The Contractor shall, after completion of the original test of the installation, and acceptance by the Architect, provide any service incidental to the proper performance of the electrical systems under guarantees outlined above for a period of one (1) year.
- 1.14 WARRANTY: The Contractor shall, after completion of the original test of the installation, and acceptance by the Architect, provide any service incidental to the proper performance of the plumbing, air conditioning, ventilating, heating and control systems under guarantees outlined above for a period of one (1) full year after acceptance by the Architect and Owner. Regardless of anything to the contrary in warranties by the equipment manufacturer involved, the Contractor's warranty shall run for one full year after final acceptance by the Architect.
- 1.15 DEFINITIONS
- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, 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.
- 1.16 ELECTRICAL LICENSE REQUIREMENT
- A. No person shall perform electrical work on the contract without possessing an Arkansas State Master or Journeyman License from the Arkansas State Electrical Examiners Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one to one ratio.
 - B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.
- 1.17 ELECTRONIC DRAWING FILES: Electronic drawing files will be available to the Contractor, Sub-Contractors, and/or Vendors to prepare shop drawings, etc. An AutoCAD Release Form will be submitted for signature *prior to any drawing files released*.

PART TWO - PRODUCTS

2.01 GENERAL EQUIPMENT AND MATERIALS

- A. All materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. The equipment to be furnished under each section of the specification shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment, and shall be the manufacturer's latest approved design.
- B. When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance. Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- C. In order to establish standards of quality, the engineer has, in the detailed specifications referred to certain products by name and catalog number. This procedure is not to be construed as eliminating from competition other products of equivalent or better quality by other manufacturers where fully suitable in design. Where multiple manufacturing sources are shown on the drawings or herein specified, the subcontractor shall limit his bid to one of those manufacturers.
- D. Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
- E. Asbestos products or equipment or materials containing asbestos shall not be used.
- F. Equipment and materials shall be delivered to the site and stored in the original containers, suitably sheltered from the elements. Items subject to moisture damage (such as controls, dry transformers, breakers, etc) shall be stored in dry, heated spaces.
- G. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury and theft. At the completion of the work, fixtures, equipment, and materials shall be cleaned and polished thoroughly. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- H. Main switchboard shall be provided with a heater of type approved by Architect. Heater shall be installed in switchboard, and shall remain as directed by Architect from time of installation until final acceptance.
- I. It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. The Contractor shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the Drawings and Specifications.

- J. Manufacturer's directions shall be followed completely in the delivery, storage, protection, and installation of all equipment and materials. Should the Contractor perform any work that does not comply with the manufacturer's directions, he shall bear all costs arising in correcting the deficiencies.

2.02 MATERIALS AND COMPONENTS

- A. General: For each electrical connection indicated on drawings, provide complete assembly of materials, including but not necessarily limited to pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete splices and termination of types indicated.

- 1. Raceway, Tubing and Fittings:

- General: Provide conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) indicated for each type service / connections shown. Where types and grades are not indicated, provide proper selection to fulfill wiring requirements complying with the latest Electrical Codes, as well as, requirements listed under Division 26 "Raceway and Boxes for Electrical Systems" section.

- B. Wire, Cable and Connectors:

- 1. General: Provide wires, cables and connectors complying with Division 26 "Electrical Power Conductors and Cables".
 - 2. Wire: Unless otherwise indicated, provide wires/conductors for final electrical connections, which match wires/conductors of the wire supplying power to the equipment, device, appliance, etc.

2.03 EQUIPMENT ACCESSORIES

- A. The Contractor shall furnish and install all equipment, accessories, connections, and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner, whether or not specifically shown on the plans or herein specified.
- B. Connections: All final connections to equipment shall be installed as required by the manufacturer and/or Vendor.
- C. Equipment furnished under other Sections: This Contractor shall furnish all necessary material and labor for the connection to the mechanical and electrical systems of all fixtures and equipment requiring such connections, and which fixtures and equipment are furnished by the Owner or are specified under other section of these specifications. If any such fixtures or equipment are not delivered prior to final acceptance, the services shall be capped or plugged at walls or floors as directed, and shall be left ready for future connection.
- D. Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, wire nuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

- E. Connections Different From Those Shown: Where equipment requiring different arrangement or connections from those shown is approved, it shall be the responsibility of the Contractor to install the equipment to operate properly with the intent of the drawings and specifications. When directed, the Contractor shall submit drawings showing the proposed installation. If the proposed installation is approved, the Contractor shall make all incidental changes. The Contractor shall provide any additional equipment required for the proper operation of the system resulting from the selection of equipment, including all required changes in affected trades. The Contractor shall be responsible for the proper location of roughing in and connections by other trades. All changes shall be made at no increase in the contract amount or additional cost to the other trades.

2.04 LIGHT FIXTURES

Contractor shall furnish, install and adjust complete and ready to operate each and every light fixture shown and scheduled on the drawings.

- A. This Contractor shall exercise extreme care in laying out his work so as to insure that ceiling outlets are located symmetrically within the area and with respect to air conditioning, heating, and ventilating outlets, tile patterns, finishes, etc. Any errors shall be corrected at no additional cost. This contractor shall check with the ceiling contractor for type of ceiling and order fixtures that are compatible with ceiling material as required to support fixtures. See reflected ceiling plan for exact location of fixtures.
- B. The orientation of light fixtures in the same space shall match and be approved by Architect.
- C. Contractor shall provide 0-10V low-voltage wiring to all fixtures throughout entire circuit whether shown or not.
- D. Occupancy sensor and lighting control manufacturers specified shall provide layout shop drawings prior to beginning work.

PART THREE - EXECUTION

3.01 COORDINATION OF WORK

- A. The Contractor shall compare the Electrical Drawings and Specifications with the drawings and specifications for other trades and shall report any discrepancies between them to the Architect and obtain written instructions for changes necessary in the Electrical Work. The Electrical Work shall be installed in cooperation with other trades installing related work. Before installation, the Contractor shall make proper provision to avoid interferences. All changes required in the work of the Contractor caused by a failure to coordinate the work with other trades shall be made by the Contractor at his own expense.

- B. Anchor bolts, sleeves, inserts and supports that may be required for the Electrical Work shall be furnished under the same section of the specifications as the respective items to be supported, and they shall be installed, except as otherwise specified, by the trade furnishing and installing the material in which they are to be located. Location of anchor bolts, sleeves, inserts and supports shall be directed by the trade requiring them, which trade shall also insure that they are properly installed. Any expense resulting from the improper location or installation of anchor bolts, sleeves, inserts and supports shall be paid for by the Contractor under the section of the specifications for the trade with the responsibility for directing their proper location.
- C. Sleeves: All conduits passing through masonry construction shall be fitted with 20 gauge galvanized steel sleeve. Each sleeve shall extend through its respective floor or wall, and shall be cut flush with each surface, except floor sleeves which shall be extended to a minimum of 1 inch above the floor. Unless otherwise noted, the sleeve shall be two sizes larger than the overall outside diameter of the conduit. Sleeves thru non-fire rated structure may be PVC. Sleeves in walls below grade shall be a pre-engineered assembly equal to LINK-SEAL as manufactured by Thunderline Corporation; assembly shall be sized and installed in accordance with manufacturer's recommendations. All sleeves shall be fastened in place prior to pouring concrete and caulked with flexible caulking or LINK-SEAL device as applicable. Sleeves or conduits shall not be installed in spread footing. Core drilling will not be permitted without consent of the structural engineer. Sleeves in grade beams shall be installed near center.
- D. Firestopping:
1. All fire walls, fire barriers, fire partitions, upper floors of multi-story buildings where pipe or ducts pass through, into, or out of, shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 814, with a minimum positive pressure differential of 0.01 inch of water and shall have an F rating of not less than the required fire-resistance rating of the wall penetrated.
 2. A UL approved firestop system shall be as specified by 3M Fire Protection Products, SpecSeal Firestop Products, or approved equal.
 3. Firestopping material and method of installation shall be submitted to the Architect for approval.
 4. Steel electrical boxes in fire walls, barriers or partitions shall be covered on the back with UL classified putty pads.
 5. Cable tray penetrations thru fire walls, barriers and partitions shall be sealed with removable intumescent firestop pillows.
- E. Slots, chases, openings and recesses through floors, walls, ceilings and roofs as specified will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located, and shall do any cutting and patching caused by the neglect to do so. Slots, chases, openings and recesses in existing structures shall be cut by the trade requiring them and patched and repaired by that trade. No structural member shall be disturbed in any manner without written permission of the Architect.
- F. Where electrical items penetrate the roofing, the Contractor shall coordinate location and size as required for factory vent flashing assembly to be furnished and installed by the Roofing Contractor in strict accordance with the Roof Manufacturer's recommendation. If single ply membrane roof is used, Contractor shall use factory pipe flashing assembly as recommended by Roofing Manufacturer. Coordinate locations with Roofing Contractor.

- G. Locations of conduits and electrical equipment, etc. shall be adjusted to accommodate the work and to avoid interferences anticipated and encountered. The Contractor shall determine the exact route and location of each conduit and equipment gear prior to installation.
1. Right-of-Way: General and structural components have right of way. Equipment and piping whose elevations cannot be changed shall have the right of way over equipment and piping whose elevations can be changed. The Contractor shall coordinate the location of all electrical gear and piping with all trades prior to installation.
 2. Offsets, transitions and changes in direction in pipes and ducts shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall furnish and install all traps, air vents, sanitary vents, etc., as required to effect these offsets, transitions and changes in direction.
- H. Installation and Arrangement: The Contractor shall install all Electrical Equipment to permit removal (without damage to other parts). Provide adequate access to all other parts requiring periodic replacement or maintenance. The Contractor shall arrange equipment to permit ready access to components and to clear the openings of swinging and overhead doors and of access panels.
- I. Coordination Drawings: The Contractor shall furnish detailed coordination drawings for all congested areas including but not limited to Mechanical Rooms and Electrical Rooms. Coordination drawings shall indicate room dimensions, support column locations and space requirements for installation and access. Include the following:
1. Planned equipment layout.
 2. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 3. Equipment and accessory locations, service connections, and support details.
 4. Exterior wall and foundation penetrations and sleeve locations.
 5. Sizes and location of required concrete pads and bases.
 6. Floor plans, elevations, and details to indicate penetrations in floors, walls, and roofs and their relationship to other penetrations and installations.
 7. Layout shall include all other trades impacting the Electrical work.
- J. Access: The Contractor shall provide all necessary access panels in walls, ceilings, equipment, etc., as required for inspection of interiors and for proper maintenance and or installation of equipment. Where changes from the plans are made by the Contractor in the installation of his work, he shall provide any and all access panels required as a result of these changes.
- K. Drawings by Contractor: When directed by the Architect, the Contractor shall submit for approval by the Architect drawings clearly showing the Electrical Work and its relation to the work of other trades before commencing shop fabrication or erection in the field.
- L. Cleanup: The contractor shall remove his tools, machinery, debris, etc., from the premises when his part of the work is finished. He shall leave the premises free of all obstructions and hindrances.

3.02 INSTALLATION OF ELECTRICAL CONNECTIONS

- A. Install electrical connections as indicated; in accordance with connector manufacturer's written instructions and with recognized industry practices, and complying with requirements of NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.
- B. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Wherever possible, mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.
- C. Coordinate installation of all required electrical connections for equipment with equipment supplier.
- D. Cover splices with electrical insulation equivalent to, or of higher rating, than insulation on conductors being spliced.
- E. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated.
- F. Trim cables and wires, as short as practicable and arrange routing to facilitate inspection, testing and maintenance.
- G. Tighten wire-binding connector screws firmly.
- H. Terminals for Designed Use: Each cable, conductor or wire shall terminate in a lug designed for that particular use: (i.e., one conductor per lug unless lug is designed to have additional conductors installed).
- I. Check and re-tighten all splices, joints, terminations and connections originally installed by the manufacturer, where bolted, threaded or other mechanical means were used to secure joints and splices.
 - 1. This shall include, but not be limited to: main services entrance equipment, distribution panels, branch circuit panels, motor control centers, transfer switches, etc.
- J. Provide flexible conduit for motor connections, and for other electrical equipment connections where subjected to movement and vibration. The Contractor shall isolate motor starters, conduits, fixture ballasts, transformers, equipment, etc., as required to insure an acceptable noise level free from objectionable vibration.
- K. Provide liquid-tight flexible conduit for connection of motors and for other electrical equipment in all central plants, boiler rooms, and where subject to movement and vibration, and also where subjected to one or more of the following conditions:

Exterior location.

Moist or humid atmosphere where condensate can be expected to accumulate.

Corrosive atmosphere.

Subjected to water spray.

Subjected to dripping oil, grease, or water.

L. All circuits shall contain a dedicated neutral - no sharing.

M. All circuits on the emergency power system shall be kept separate from normal circuits.

3.03 600 VOLT INSULATION TEST

Prior to energizing the electrical system the contractor shall provide insulation resistance tests for all distribution and utilization equipment. The Contractor shall provide a suitable and stable source of test power. The insulation test shall be a “megger” test at 500 volts D.C. for one-half minute. The test shall be scheduled in advance with the Architect/Engineer. A test report shall be submitted to the Architect/Engineer for approval. The minimum insulation resistance for all conductors shall be 1,000,000 ohms. Conductors testing below the minimum insulation resistance shall be replaced and tested again.

3.04 CONTINUITY TEST

The Contractor shall perform a continuity test on the entire electrical system prior to energizing the system to insure proper cable connections. Contractor to verify, test and demonstrate all low-voltage wiring connections, including AV, prior to energizing system. Contractor is responsible for any damage or labor that results.

3.05 CONNECTION TORQUE TESTS

All larger conductor bolted connections shall be torque tested using a torque wrench. Torque shall be to National Electrical Testing Association’s (NETA) Standards.

3.06 REMOVAL OF RUBBISH

Contractor shall remove his rubbish from building site at intervals and shall maintain the spaces allotted him in an orderly manner. On completing his work, and prior to submission of final estimate, he shall remove all tools, appliances, material and rubbish from the grounds.

3.07 FIRE ALARM SYSTEM TEST

The fire alarm system shall be tested by the company responsible for the installation and shall submit a certification that the system operates properly.

3.08 GROUND RESISTANCE MEASUREMENTS

A. Ground resistance measurements of each ground rod shall be taken and certified by the Contractor to the Architect. No part of the electrical distribution system shall be energized prior to the resistance testing of that system’s ground rods and grounding system and submission of test results to the Architect. Test reports shall indicate the location of the ground rod and grounding system and the resistance and the soil conditions at the time the test was performed. When the building water service is used as a ground of part of the grounding system, ground-resistance measurements shall also be made of this connection. Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds. The resistance to ground shall be measured using the fall-of-potential method described in IEEE No. 142.

- B. Contractor shall provide actual ground-fault injection testing for service disconnects with ground-fault tripping.

3.09 MECHANICAL OPERATION TESTS

All electrical equipment, such as switches, circuit breakers, etc., shall be tested by operating the device to verify that the mechanical portions of the device are functioning.

3.10 ROTATIONAL TESTS

The Contractor shall assist Mechanical Contractor in performing rotational tests on all motors provided under this contract. If rotational tests determine that conductors must be transposed to change direction of rotation, the conductors shall be changed at the make-up box on the motor; or if the change is made elsewhere, then the conductor's color coding shall be changed.

3.11 CUTTING AND PATCHING

- A. Under each Section of the specifications, the Contractor shall be responsible for all required digging, cutting, etc., incident to his work under that Section, and shall make all satisfactory repairs, but in no case shall the Contractor cut into any major structural element, beam or column.
- B. Pavements, sidewalks, roads and curbs shall be cut, patched, repaired and/or replaced as required to permit the installation of the work of the various trades and such cutting, patching, repairing and replacing shall be the responsibility of and paid for by the Contractor under the Section of the specifications for the trade requiring the work.
- C. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error or tardiness or because of any damage done by him.
- D. Where holes in concrete floors are more than 1/2 inch diameter larger than conduit, the excess openings shall be filled or covered with damp-mix mortar or concrete to a thickness of a least 5 inches.

3.11 EXCAVATION AND TRENCHING FOR ELECTRICAL CONDUIT

- A. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depths indicated on the drawings or as otherwise specified. 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. Such grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other methods. Unless otherwise indicated, excavation shall be by open cut except that short sections of a trench may be tunneled if the conduit or sleeves can be safely and properly installed and backfill can be properly tamped in such tunnel sections. Refer to Division 31 - Earthwork for additional requirements.

- B. This specification and the drawings in no way imply as to the conditions of the soil to be encountered. When excavating may be required in execution of the work, this contractor agrees that he has informed himself regarding conditions affecting the work and labor and materials required, without recourse to any representation as to soil conditions that may appear, or seem to be implied, in any portion of the contract documents.
- C. Trench Excavation: Trenches shall be of necessary width for proper laying of the conduit, and the banks shall be as nearly vertical as practical. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for the conduit on undisturbed soil at every point along its entire length. Except where rock is encountered, care shall be taken not to excavate below the depths indicated. Where rock excavations are required, the rock shall be excavated to a minimum overdepth of 4 inches below the trench depths indicated on the drawings, or specified. Overdepths in the rock excavation and unauthorized overdepths shall be backfilled with loose, granular, moist earth, thoroughly tamped. Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade coarse sand, fine gravel or other suitable materials, as hereinafter specified.
- D. Depth of Cover: Trenches for utilities shall be of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.

<u>Voltage</u>	<u>Depth (Minimum)</u>
600 and below	30 inches
600 to 15,000	36 inches

- E. Protection of Existing Utilities: Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor at his expense.

3.12 BACKFILLING OF TRENCHES

- A. Trenches shall not be backfilled until all required pressure and other tests have been performed, witnessed by the Architect, and until the utilities systems as installed confirm to the requirements of the drawings and specifications.
- B. Contractor shall perform all excavations of every description and of whatever substances encountered, to the depths indicated on the drawings and required for the installation of his portion of the utilities systems. Wherever possible, all exterior lines shall be installed with a minimum of 24" of cover, unless shown otherwise. All excavated materials not required for fill or backfill shall be removed and wasted as directed by the Architect. All excavations shall be made by open cut. The banks of trenches shall be kept as nearly vertical as practicable and where required shall be properly sheeted and braced. Rock shall be excavated to a minimum overdepth of 4" below the trench depths specified. The overdepth rock excavation shall be backfilled with loose, moist earth, thoroughly tamped. All grading in the vicinity of excavations shall be controlled to prevent surface ground water from flowing into the excavations. Any water accumulated in the excavations shall be removed by pumping, or by other approved method.

- C. Normal Backfill: Where compacted backfill is not specified the trenches shall be carefully backfilled with the materials approved for backfilling (See appropriate section), deposited in 6" layers and thoroughly and carefully rammed until the pipe has a cover of not less than one foot. The remainder of the backfill material shall then be carefully placed in the trench in one foot layers and tamped. Settling the backfill with water will not be permitted. The surface shall be graded to a reasonable uniformity and the mounding over trenches left in a uniform and neat condition. Surface condition shall be equipment to match the existing condition prior to trenching (sod, asphalt, etc.).
- D. Compacted backfill shall be used under slabs on grade, building structure, concrete paving and asphaltic concrete paving. The soils used in the fill shall be granular in nature and shall not contain roots, sod, rubbish or stones over 1-1/2" maximum dimension.
 - 1. Required Density:
 - a. All fills shall be compacted to a dry density equal to at least 90% of the maximum density determined in accordance with the Modified AASHO Method of Compaction. The maximum density and optimum moisture content shall be determined on the basis of laboratory tests conducted on the materials used in the fill.
 - b. Modified AASHO Compaction Method provides that soil samples be compacted in 5 equal layers in a standard compaction cylinder having a volume of 1/30 cu. ft. using twenty-five (25) 18" blows of 10 pound rammer to compact each layer.
 - 2. Control Tests: Adequacy of compaction shall be determined on the basis of in-place density determinations that are to be conducted while the fills are being placed. The results of these tests shall be the basis on which satisfactory completion of the work is judged. Should the fills fail to meet the specified densities, the Contractor shall remove and recompact the soils until the specified densities are achieved.
 - 3. Equipment: The choice of compaction equipment shall be made by the Contractor; however, the equipment shall be adequate for achieving the specified densities. Use of hand-operated, power-driven compaction equipment may be necessary at locations inaccessible to roller-type equipment.

3.13 CONSTRUCTION PHASING

- A. The Contractor shall refer to the General Requirements of this specification and prepare all work schedules required to perform all work as shown on the Drawings and as herein specified.
- B. All services such as, but not limited to, lighting, power and signaling shall be maintained to all areas of the building during this Contract. Temporary service connections will be required where necessary to maintain these services. The Contractor will make these connections as required to provide continuous service.
- C. This contractor shall furnish and install temporary construction power wiring as required to provide sufficient power and lighting for all construction needs. Temporary electrical service shall be obtained in the name of the General Contractor and it will be the General Contractor's responsibility to pay all power company charges. The temporary service shall be obtained from the local utility company. All receptacles shall be grounding type. Provide temporary lighting as required or directed by the Architect for adequate illumination for construction purpose.

- D. It will be the responsibility of the Contractor to carefully review the drawings, specifications and existing conditions with reference to these types of services so that the building may function normally during the construction process.

3.16 SAFETY

- A. The electrical subcontractor is completely responsible for how all his work is performed; safety, in, on, or about the job site; methods of work performance; and timeliness in such performance. In the event he is unsatisfied with the performance and/or cooperation of other trades, he shall set forth such complaints in writing for the Architect's review. In no event shall this subcontractor expect to be specifically directed in the protection of personnel or material by the Owner, Architects, or Engineer.

3.17 ELECTRICAL WIRING METHODS / CONNECTIONS

- A. The electrical wiring for the mechanical equipment furnished by others is separated into two main wiring divisions: (1) Power wiring by electrical contractor, and (2) control wiring below 120V by the mechanical contractor.
 - 1. Power wiring shall be the energy source and include installation of circuit protective devices, motor starters or controllers, conduit, wiring and safety disconnects from the power supply, and termination at the motor or appropriate terminals on the equipment. This also includes all 120V control wiring.
 - 2. Control wiring shall comprise all wiring not included in power wiring and below 120V. This wiring shall specifically include all automatic temperature control wiring, safety pilot interlocking wiring, push button starting, pilot light and signal wiring, etc., that is not included as part of pre-wired equipment but necessary for the proper operation and safety of the equipment. All conduit, boxes, etc., required for control wiring shall be provided and installed by the electrical contractor.
- B. The mechanical contractor shall furnish to the electrical contractor all magnetic motor starters and operators for installation and connection by the electrical contractor except for kitchen hood interlock system. (See wiring diagrams on drawings). Electrical contractor shall interlock 120V or above wiring between fans and operable louvers. Electrical contractor to furnish all manual motor starters.
- C. Wherever equipment is shown requiring electrical connection as specified, all wiring shall be furnished and installed under this section of the specifications. Starting switches, protective devices, and other means for the operation and control of equipment shall be furnished under the various sections and installed under the ELECTRICAL SECTION unless specifically noted otherwise on the Drawings.
- D. Additional disconnects required by the National Electrical Code shall be furnished, installed and connected under the ELECTRICAL SECTION. Motor terminal or equipment connection shall terminate in a junction box or disconnect adjacent to the equipment.

3.18 PAINTING

- A. The Contractor shall remove all rust, oil and grease from exposed surfaces and clean all apparatus or materials specified to be painted under this section of the specifications. Contractor shall paint equipment, piping, etc., in accordance with Division 9. Equipment specified to have factory finishes shall be protected until completion of the Contract, with Contractor being responsible for maintaining finishes.
- B. Apply paint to exposed piping according to the following, unless otherwise indicated:
 - 1. Interior, Ferrous Piping: Use semi-gloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 2. Interior, Galvanized-Steel Piping: Use semi-gloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 3. Interior, Ferrous Supports: Use semi-gloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 4. Exterior, Ferrous Piping: Use semi-gloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
 - 5. Exterior, Galvanized-Steel Piping: Use semi-gloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 6. Exterior, Ferrous Supports: Use semi-gloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
- C. Do not paint piping specialties with factory-applied finish.
- D. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
- E. Galvanized surfaces damaged during installation shall be repaired with a galvanized repair compound complying with Mil Spec DOD-P-21035B. Any equipment scratched, marred or damaged will be repainted to the original condition.

3.19 INSTRUCTING OWNER'S REPRESENTATIVE

- A. The Contractor shall instruct representatives of the Owner in the proper operation and maintenance of all elements of the Electrical system.
- B. Contractor shall spend not less than one (1) day in such formal instruction to fully prepare the Owner's representative to operate and maintain the Electrical systems.

END OF SECTION

LOW-VOLTAGE ELECTRICAL POWER
CONDUCTORS AND CABLES

PART ONE - GENERAL

1.01 GENERAL

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division 26 Common Work Results for Electrical section, and is part of each Division 26 section making reference to wires and cables specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of electrical wire and electrical cable work is indicated by drawings and schedules.
- B. Types of wire, cable and connectors in this section include the following:
 - 1. Copper conductors
 - 2. Fixture wires
 - 3. Pigtail type connectors
 - 4. Tap type connectors
 - 5. Split-bolt connectors
- C. Applications for wire, cable and connectors in the section required for project are as follows:
 - 1. Power distribution circuitry
 - 2. Lighting circuitry
 - 3. Appliance and equipment circuitry
 - 4. Motor-branch circuitry
 - 5. Fire alarm circuitry

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacturer of electrical wire and cable products of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical wiring work similar to that required for project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wire, cable and connectors.
- D. UL Compliance: Comply with UL standards pertaining to wire, cable and connectors.
- E. UL Labels: Provide electrical wires, cables and connectors which have been UL-listed and labeled.

- F. NEMA/ICEA Compliance: Comply with applicable portions of NEMA/Insulated Cable Engineers Association standards pertaining to materials, construction and testing of wire and cable.
- G. ANSI/ASTM: Comply with applicable portions of ANSI/ASTM standards pertaining to construction of wire and cable.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data on wires and cables including dimensions, capacities, ratings, performance characteristics, gages and installation instructions.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of wire, cable and connector):
 - 1. Wire and Cable:
 - a. Advance Wire and Cable, Inc.
 - b. Cerro Wire and Cable Co.
 - c. Electrical Conductors, Inc.
 - d. General Cable Corp.
 - e. Hitemp Wires, Inc.
 - f. Rome Cable Corp.
 - g. Southwire Company
 - h. Triangle PWC, Inc.
 - 2. Connectors:
 - a. AMP, Inc.
 - b. Burndy Corp.
 - c. Gould, Inc.
 - d. Ideal Industries, Inc.
 - e. O-Z/Gedney Co.
 - f. Pyle National Co.
 - g. Thomas and Betts Co.

2.02 WIRE, CABLE AND CONNECTORS

- A. General: Except as otherwise indicated, provide wire, cable and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, and as required for the installation.

B. Wire:

1. Provide factor-fabricated wire of sizes, ratings, materials and types indicated for each service. Where not indicated, provide proper selection as determined by Owner to comply with project's installation requirements and NEC standards. Select from the following types, materials, conductor configurations, insulation and coverings:

UL Type: THHN

UL Type: THW

UL Type: THWN

UL Type: XHHW

Material: Copper

Conductors: Solid (AWG 12 & AWG 10 only).

Conductors: Concentric-lay-standard (standard flexibility).

Outer Covering: Cross-link polyethylene

Outer Covering: Thermoplastic

2. Conductors to be color coded as follows:

120/208 Volt Conductors:

Phase A - Black

Phase B - Red

Phase C - Blue

Neutral - White

Isolated Ground - Green with Orange Stripe

Equipment Ground - Green

277/480 Volt Conductors:

Phase A - Brown

Phase B - Orange

Phase C - Yellow

Neutral - Gray

Equipment Ground - Green

C. Cable:

1. Provide factory-fabricated cable of sizes, ratings, materials, and jacketing/sheathing as indicated for each type service. Where not indicated, provide proper selection as determined by Engineer to comply with installation requirements and NEC standards.

D. Connectors:

1. General: Provide factory-fabricated, metal connectors of sizes, ratings, materials, types and classes as indicated for each service. Where not indicated, provide proper selection as determined by Engineer to comply with installation requirements and NEC standards. Select from the following types, classes, kinds and styles.

Type: Pressure
Type: Crimp
Type: Threaded

Class: Insulated
Class: Non-insulated

Kind: Copper

Style: Butt connection
Style: Elbow connection
Style: Combined "T" and straight connection.
Style: Insulation-piercing tap connection.
Style: Split-bolt parallel connection
Style: Tap connection.
Style: Pigtail connection

2. If conductors are larger than set screw terminal provisions in panelboards, switches, etc., contractor shall furnish Burndy Type YE-P compression adaptors or AYP connectors as required. Adaptor shall match aluminum or copper as required. Cutting strands of conductors will not be allowed.

PART THREE - EXECUTION

3.01 EXAMINATION:

- A. Prior to installation verify that interior of building has been protected from weather.
- B. Prior to installation verify that mechanical work likely to damage wire (and cable) has been completed.

3.02 PREPARATION:

- A. Completely and thoroughly swab raceway before installing wire.

3.03 WIRING METHODS:

- A. Interior Locations: Use only building wire, Type THW or THHN/THWN insulation, in raceway unless otherwise indicated on the Drawings.
- B. Wet or Damp Interior Locations: Use only building wire, Type THW or THHN/THWN in raceway or liquid tight flexible conduit.

- C. Exterior Locations: Use only building wire, Type THW or THHN/THWN insulation in raceway.
- D. Underground Installations: Use only building wire, Type THW or THHN/THWN insulation in raceway.
- E. Use wiring methods indicated on Drawings.

3.04 INSTALLATION:

- A. Install products in accordance with manufacturers instructions.
- B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- C. Use stranded conductors for control circuits 24 volts and below. Minimum size shall be 16 AWG or as indicated on the drawings.
- D. Use conductor not smaller than 12 AWG for power and lighting circuits (including all fixture whips) and 120 volt control circuits.
- E. Conductors shall be continuous from outlet to outlet.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet or where the distance to the first outlet exceeds 50 feet.
- G. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- H. Pull all conductors into raceway at same time.
- I. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- J. Protect exposed cable from damage.
- K. Support cables above accessible ceiling, unistrut, bridle rings, and cable ties to support cables. Do not rest cable on ceiling panels.
- L. Use suitable cable fittings and connectors.
- M. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- N. Clean conductor surfaces before installing lugs and connectors.
- O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- P. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape as follows:
 - 1. Make a smooth assembly with 3-M Scotchfil insulating putty. Putty to fill all voids and be tapered to wire insulation to form a smooth transition.
 - 2. Finish with two (2) one-half lapped layers of Scotch 33+ plastic tape.

- Q. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- R. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- S. Route circuits at own discretion; however, circuit numbers shall be according to Drawings.
- T. On three phase systems, no more than 3 circuits are allowed in any one conduit without written permission from the Engineer.
- U. On single phase systems, no more than 2 circuits are allowed in any one conduit without written permission from the Engineer.
- V. Common neutrals are not allowed unless otherwise noted. Each circuit shall have a dedicated neutral. Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
- W. All parallel conductors shall be of the same length, of the same conductor material, circular - mil area, same insulation type and terminated in the same manner. No parallel conductors smaller than #1/0 are acceptable.
- X. This subcontractor is warned to adhere strictly to the circuitry shown on the plans to achieve optimum system balance. Failure to properly circuit according to plans shall result in rewiring as directed at no additional cost to the Owner.
- Y. Insulation resistance tests shall be made in accordance with the National Electrical Code in the presence of the Architect or his representative, and the results filed with the Architect and Engineer before final acceptance.
- Z. Run conductors of same circuit in same conduit.
- AA. Run conductors of different voltage system in separate conduits.
- BB. All wire installed on the load side of branch GFI circuit breakers and isolation power panels shall be type "XHHW" or "XLP". Use of pulling compound on these conductors is prohibited.

3.05 INTERFACE WITH OTHER PRODUCTS:

- A. Identify wire and cable under provisions of Section 26 05 53.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings in each junction box and in each panelboard.

3.06 FIELD QUALITY CONTROL:

- A. Perform field inspection and testing.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

3.07 PROHIBITED USES:

- A. Types AC and MC cables.
- B. Types NM, NMC, and NMS cables.

END OF SECTION

GROUNDING AND BONDING
FOR ELECTRICAL SYSTEMS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division One Specification section apply to work of this section.
- B. Division 26 – Common Work Results for Electrical sections apply to work specified in this section.

1.02 DESCRIPTION OF WORK:

- A. Extent of grounding and ground-fault protection work is indicated by drawings and schedules.
- B. Types of grounding and ground-fault protection in this section include the following:
 - 1. Grounding:
 - a. Metal building frames.
 - b. Separately derived systems.
 - c. Enclosures.
 - d. Systems.
 - e. Equipment.
 - 2. Ground-Fault Protection:
 - a. Ground-fault circuit interrupters.
- C. Requirements of this section apply to electrical grounding and ground-fault protection work specified elsewhere in these specifications.

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of grounding and ground-fault protection units of types and ratings required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with grounding and ground fault installation work similar to that required for this project.
- C. NEC Compliance: Comply with NEC as applicable to electrical grounding and ground-fault protection systems.
- D. ANSI/IEEE Compliance: Comply with C114.1 (IEEE Std 142) and IEEE Stds Nos. 241 and 242 pertaining to grounding and ground-fault protection of power systems.

- E. ANSI/UL Compliance: Comply with requirements of ANSI/UL and UL standards pertaining to grounding and ground-fault protection equipment and devices. Provide products which have been UL-listed and labeled.
- F. NEMA Compliance: Comply with NEMA Stds Pub Nos. PB 1.2 and AB 1, pertaining to construction and installation of ground-fault protection devices and molded-case circuit breakers.

1.04 SUBMITTALS:

- A. Product Data: Submit manufacturer's data on grounding and ground-fault protection equipment and devices.
- B. Maintenance Data: Submit maintenance instruction and spare parts lists. Include this data in maintenance manuals.

PART TWO - PRODUCTS

2.01 GROUNDING:

- A. Materials and Equipment:
 - 1. Except as otherwise indicated, provide each electrical grounding system indicated, with assembly of materials including, but not necessarily limited to, cable/wires, connectors, terminals (solderless lugs), bonding jumper braid, and other items and accessories needed for complete installation. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for application indicated.
 - 2. Provide conduit, duct and fittings complying with Section 26 05 33 - Raceways and Boxes for Electrical Systems, in accordance with the following listing:
 - a. Rigid steel conduit.
 - b. Electrical metallic tubing.
 - c. Flexible metal conduit, Type 2.
 - d. Liquid-tight flexible metal conduit.
 - e. Rigid metal conduit fittings.
 - f. EMT fittings, Type 1.
 - g. Flexible metal conduit fittings.
 - h. Liquid-tight flexible metal conduit fittings.
- B. Electrical Grounding Conductors:
 - 1. Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC. All grounding conductors shall be copper.
- C. Bonding Plates, Connectors, Terminals and Clamps:
 - 1. Provide electrical bonding plates, connectors, terminals and clamps as recommended by bonding plate, connector, terminal and clamp manufacturer's for indicated applications.

2.02 GROUND FAULT PROTECTION DEVICES:

- A. General: Except as otherwise indicated, provide ground-fault protection devices and components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for applications indicated.
- B. Circuit Interrupters / Circuit-Breakers: Provide 1" wide module bolt-on panelboard circuit breakers, with integral ground-fault circuit interrupters, UL-rated Class A, Group 1; with ampacity rating, pole construction, voltage and asymmetric interruption capacity as shown on the drawings. Provide with solid-state ground-fault sensing and signaling, with 5 milliamperes ground-fault sensitivity, ± 1 milliampere. Equip with PUSH-TO-TEST capability. Provide modules which fit panelboards in which they are located.
- C. Manufacturer: Subject to compliance with requirements, provide ground-fault circuit interrupters of one of the following:
 - 1. Cutler-Hammer
 - 2. General Electric Company
 - 3. Square D Company
- D. Contractor shall include ground-fault performance current injection testing in accordance with manufacturer and NEC. A written record of this test shall be given to Owner.

PART THREE - EXECUTION

3.01 INSTALLATION OF GROUNDING AND GROUND-FAULT PROTECTION SYSTEMS:

- A. Install electrical grounding systems and ground-fault protection devices as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure grounding and ground-fault protection devices comply with requirements. Comply with requirements of NEC, NESC, and NEMA standards for installation of grounding and ground-fault protection systems and devices.
- B. Coordinate with other electrical work as necessary to interface installation of grounding system and ground-fault protection devices with other work.
- C. Install clamp-on connectors only on thoroughly cleaned metal contact surface, to ensure electrical conductivity and circuit integrity.
- D. All wire used on the load side of branch GFCI protective devices shall be Type XHHW, XLP, or equivalent. Wiring pulling compound shall not be used on this wiring to facilitate installation.
- E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

- F. Size and type of green equipment ground conductors and method of securing them to obtain electrical continuity and effective grounding as per National Electrical Code, Article 250. Conduit shall not be used for the primary grounding means, but shall be electrically continuous for use as a supplemental grounding system.
- G. Neutrals of lighting systems shall be grounded independently and in accordance with the National Electrical Code.
- H. All metal raceway system, including cabinets, conduit and boxes, shall be grounded to a water pipe with UL approved grounding clamp in accordance with the National Electrical Code.
- I. An equipment ground conductor shall be installed in all conduits.
- J. The service entry equipment, including switchboard frame and grounding bus and all outgoing feeder and/or motor supply connections shall be permanently and effectively grounded as required per Article 250.50 of the National Electric Code. The grounding electrode system shall consist of the following:
 - 1. 1" metal water pipe with connection within 5'0" of point of entry to building.
 - 2. Concrete encased rebar.
 - 3. Metal frame of the building or structure.
 - 4. 3/4" x 10'0" ground rod.
 - 5. Ground ring consisting of 20'0" of #2 AWG base copper conductor.
- K. Use Burndy Bar Connector or Cadwell to attach to water line. Contractor to verify that the resistance to ground is less than 25 ohms. Ground wire to panel shall be in PVC. All connection shall be visibly inspected and approved by Engineer.
- L. Provide ground fault injection testing on-site as required by NEC.

3.02 TESTING:

- A. Upon completion of installation of ground-fault protection devices and after electrical circuitry has been energized, demonstrate capability and compliance with requirements using current injection testing. Where possible, correct malfunctioning units at site, then re-test to demonstrate compliance; otherwise, remove and replace with new units, and proceed with testing.
- B. Upon completion of installation of electrical grounding system, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 3 ohms, take appropriate action to reduce resistance to 3 ohms or less by driving additional ground rods and/or by chemically treating soil encircling ground rods with sodium chloride, calcium chloride, copper sulfate, or magnesium. Then re-test to demonstrate compliance.

END OF SECTION

HANGERS AND SUPPORTS FOR
ELECTRICAL SYSTEMS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division 26 Common Work Results for Electrical section and is part of each Division 26 section making reference to supports, anchors, sleeves, and seals specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of supports, anchors, sleeves and seals is indicated by drawings and schedules and/or specified in other Division 26 sections.
- B. Types of supports, anchors, sleeves and seals specified in this section include the following:
 - 1. C-clamps.
 - 2. I-beam clamps.
 - 3. One-hole conduit straps.
 - 4. Two-hole conduit straps.
 - 5. Round steel rods.
 - 6. Lead expansion anchors.
 - 7. Toggle bolts.
 - 8. Wall and floor seals.
 - 9. Conduit and box fasteners
- C. Supports, anchors, sleeves and seals furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division 26 sections.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in Manufacturer of supporting devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for this project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical supporting devices.
- D. ANSI/NEMA Compliance: Comply with applicable requirements of ANSI/NEMA Std Pub. No. FB1, "Fittings and Supports for Conduit and Cable Assemblies"

- E. NECA Compliance: Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.
- F. UL Compliance: Provide electrical components which are UL-listed and labeled.
- G. FS Compliance: Comply with Federal Specification FF-S-760 pertaining to retaining strap for conduit, pipe and cable.

1.04 SUBMITTALS

- A. Product Data: Submit catalog cuts, specifications, installation instructions, for each type of support, anchor, sleeve and seal. Submit hanger and support schedule showing manufacturer's figure number, size, location, and features for each required hanger and support.

PART TWO - PRODUCTS

2.01 MANUFACTURED SUPPORTING DEVICES

- A. General: Provide supporting devices complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation, and as herein specified. Where more than one type of device meets the following requirements, selection is Installer's option.
- B. Supports: Provide supporting devices of types, sizes and materials indicated; and having the following construction features:
 - 1. C-Clamps: Black malleable iron; 1/2" rod size; approx. 70 pounds per 100 units.
 - 2. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flange width 2"; approx. 52 pounds per 100 units.
 - 3. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; approx. 7 pounds per 100 units.
 - 4. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.
 - 5. Hexagon Nuts: For 1/2" rod size; galvanized steel; approx. 4 pounds per 100 units.
 - 6. Round Steel Rod: Black steel; 1/2" dia.; approx. 67 pounds per 100 feet.
 - 7. Offset Conduit Clamps: For supporting 2" rigid metal conduit; black steel; approx. 200 pounds per 100 units.
 - 8. Conduit and Box Fasteners: Fasteners specifically manufactured for the support of conduit and electrical boxes, UL labeled.
- C. Anchors: Provide anchors of types, sizes and materials indicated; and having the following construction features:
 - 1. Lead Expansion Anchors: 1/2"; approx. 38 pounds per 100 units.
 - 2. Toggle Bolts: Springhead; 3/16" x 4"; approx. 5 pounds per 100 units.
 - 3. Manufacturer: Subject to compliance with requirements, provide anchors of the following:
 - a. Abbeon Cal Inc.
 - b. Ackerman Johnson Fastening Systems, Inc.
 - c. Elcen Metal Products Co.

- d. Ideal Industries, Inc.
- e. Joslyn Mfg. and Supply Co.
- f. McGraw Edison Co.
- g. Rawlplug Co., Inc.
- h. Star Expansion Co.
- i. U.S. Expansion Bolt Co.
- j. Caddy-Erico Product, Inc.
- k. Hitt-Thomas Industries, Inc.

D. Sleeves and Seals: Provide sleeves and seals, of types, sizes and materials indicated; and having the following construction features:

- 1. Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals, of types and sizes indicated; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and walls. Construct with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.

E. Conduit Cable Supports: Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct for 2" rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable iron casting with hot dip galvanized finish.

F. U-Channel Strut Systems:

- 1. Provide U-channel strut system for supporting electrical equipment, 16- gage hot dip galvanized steel, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with standard green finish, and with the following fittings which mate and match with U-channel:

- a. Fixture hangers.
- b. Channel hangers.
- c. End caps.
- d. Beam clamps.
- e. Wiring stud.
- f. Thinwall conduit clamps
- g. Rigid conduit clamps.
- h. Conduit hangers.
- i. U-bolts.

- 2. Manufacturer: Subject to compliance with requirements, provide channel systems of one of the following:

- a. B-Line Systems, Inc.
- b. Elcen Metal Products Co.
- c. Greenfield Mfg. Co., Inc.
- d. Midland-Ross Corp.
- e. Power-Strut Div; Van Huffel Tube Corp.
- f. Unistrut Div; GTE Products Corp.

2.02 FABRICATED SUPPORTING DEVICES

- A. Pipe Sleeves: Provide pipe sleeves of one of the following:
 - 1. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
 - 2. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade or in exterior walls. All sleeves shall be made watertight.

PART THREE - EXECUTION

3.01 INSTALLATION OF SUPPORTING DEVICES

- A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions, and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.
 - 1. The use of support wires or tie wires is not acceptable as support for boxes conduit, or equipment.
 - 2. Boxes in ceiling spaces shall be rigidly supported from a structural member of the building directly or by using a metal brace. The metal brace shall be a minimum of 1/4" all thread rod.
- B. Coordinate with other electrical work, including raceway and wiring box and wiring work, as necessary to interface installation of supporting devices with other work.
- C. Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports within maximum spacings indicated.
- D. All void spaces within or around sleeves shall be filled with approved fire sealant.

END OF SECTION

RACEWAY AND BOXES FOR
ELECTRICAL SYSTEMS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division 26 Common Work Results for Electrical section, and is part of each Division 26 section making reference to electrical raceways specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of raceways is indicated by drawings and schedules.
- B. Types of raceways in this section include the following:
 - 1. Electrical metallic tubing.
 - 2. Flexible metal conduit.
 - 3. Liquid-tight flexible metal conduit.
 - 4. Rigid metal conduit.
 - 5. Non-metallic conduit.
 - 6. Surface Metal Raceway
- C. Types of electrical boxes and fittings in this section include the following:
 - 1. Outlet boxes.
 - 2. Junction boxes.
 - 3. Pull boxes.
 - 4. Floor boxes.
 - 5. Conduit bodies.
 - 6. Bushings.
 - 7. Locknuts.
 - 8. Knockout closures

1.03 SUBMITTALS

- A. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.04 QUALITY ASSURANCE

- A. Installer: A firm or individual with not less than five years of successful experience in installation of raceways similar to those required for this project.
- B. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to raceways.
- C. UL Compliance with Labeling: Comply with applicable portions of UL safety standards pertaining to electrical raceway systems and boxes; and provide products and components, which have been UL-listed and labeled.
- D. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of raceway systems.
- E. ANSI / NEMA Standards Compliance: Comply with ANSI C 134.1 (NEMA Standards Pub No. OS 1) as applicable to sheet-steel outlet boxes, device boxes, covers and box supports.

PART TWO - PRODUCTS

2.01 METAL CONDUIT AND TUBING

- A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness') for each service indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill Wiring requirements, and comply with applicable portions of NEC for raceways.
- B. Rigid Steel Conduit: FS WW-C-0581 and ANSI C80.1.
 - 1. Minimum size shall be 3/4 inch.
- C. Rigid Metal Conduit Fittings: FS W-F-408.
 - 1. Use Type 1 fittings for raintight connections.
 - 2. Use Type 2 fittings for concrete tight connections.
 - 3. Use Type 3 fittings for other miscellaneous connections.
- D. Electrical Metallic Tubing (EMT): FS WW-C-563 and ANSI C80.3.
 - 1. Minimum size shall be 3/4 inch.
- E. EMT Fittings: FS W-F-408.
 - 1. Use Type 1 fittings for raintight connections.
 - 2. Use Type 2 fittings for concrete tight connections.
 - 3. Use Type 3 fittings for other miscellaneous connections.
- F. Flexible Metal Conduit: FS WW-C-566, of the following type:
 - 1. Minimum size shall be 1/2 inch.
 - 2. Type 2: Zinc-coated steel.

- G. Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 1, and Style A.
- H. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible and continuous, interlocked, and double-wrapped steel; galvanize inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).
 - 1. Minimum size shall be 3/4 inch.
- I. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G.
- J. Non Metallic Conduit: Schedule 80 PVC
 - 1. Minimum size shall be 1 inch.
 - 2. NEMA TC 2 Pipe
 - 3. NEMA TC 3 Fittings
 - 4. Manufacturers:
 - a. Carlon
 - b. Engineer Approved

2.02 FABRICATED MATERIALS

- A. Interior Outlet Boxes: Provide galvanized flat rolled sheet steel interior outlet wiring boxes, of types, shapes and sizes, including box depths, to suit each respective location and installation; construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices. Gangable boxes are not acceptable.
 - 1. Interior Outlet Box Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and fulfilling requirements of individual wiring situations.
 - a. Outlet Box Mounting Supports: “Caddy” Quick Mount Box Supports H-3 or approved straps or bars.
 - b. Outlet Box Extension Rings: Raco 700 series, square cut.
 - 2. Manufacturer: Subject to compliance with requirements, provide interior outlet boxes of one of the following:
 - a. Adalet-PLM Div, Scott and Fetzer Co.
 - b. Appleton Electric Co.
 - c. Bell Electric/Square D Co.
 - d. Eagle Electric Mfg. Co., Inc.
 - e. Pass and Seymour, Inc.
 - f. RACO, Inc.
 - g. Steel City/Midland-Ross Corp.
- B. Weatherproof Outlet Boxes: Provide corrosion-resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit. Hubs cast-metal face plates with spring-hinged waterproof caps suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners.

1. Manufacturers: Subject to compliance with requirements, provide weatherproof outlet boxes of one of the following:
 - a. American Metal Forming Co.
 - b. Arrow-Hart Div., Crouse-Hinds Co.
 - c. Bell Electric/Square D. Co.
 - d. Gould, Inc.
 - e. Harvey Hubbell, Inc.
 - f. O-Z/Gedney Co.
 - g. Pyle-National Co.
- C. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seam and equipped with nuts, bolts, screws, and washers.
1. Manufacturer: Subject to compliance with requirements, provide junction and pull boxes of one of the following:
 - a. Adalet-PLM Div., Scott and Fetzer Co.
 - b. Appleton Electric Co.
 - c. Arrow-Hart Div., Crouse-Hinds Co.
 - d. Bell Electric/Square D Co.
 - e. GTE Corporation
 - f. Keystone Columbia, Inc.
 - g. O-Z/Gednew Co.
 - h. Spring City Elect Mfg. Co.
- D. Floor Boxes: Provide cast-iron waterproof adjustable floor boxes as indicated in concrete slabs on grade, with thread-conduit-entrance hubs, and vertical adjusting rings, gaskets, metal floor plates and flush duplex flap covers. Stamped steel floor boxes may be used on all floors above grade. Metal floor plate shall be compatible with type of floor finish.
1. Floor Box Accessories: Provide devices and accessories as indicated on the issued contract drawings.
 2. Manufacturer: Subject to compliance with requirements, provide floor boxes of one of the following:
 - a. American Metal Forming Corp.
 - b. Bell Electric / Square D Co.
 - c. Crouse-Hinds Co.
 - d. Harvey-Hubbell, Inc.
 - e. Pyle-National Co.
 - f. Spring City Electrical Mfg. Co.
 - g. Steel City / Midland-Ross Corp.
 - h. Walker Mfg. Co.
- E. Conduit Bodies: Provide galvanized cast-metal conduit bodies, of types, shapes and sizes, to suit respective locations and installation, construct with threaded-conduit-entrance ends, removable covers, and corrosion-resistant screws. Conduit bodies shall be compatible with conduit materials.
1. Manufacturer: Subject to compliance with requirements, provide conduit bodies of one of the following:
 - a. Allen-Stevens Conduit Fittings Corp.

- b. Appleton Electric Co.
 - c. Atlas Technologies, Inc.
 - d. Crouse-Hinds Co.
 - e. Gould, Inc.
 - f. Killark Electric Mfr. Co.
 - g. O-Z/Gedney Co.
 - h. Pyle-National Co.
 - i. Spring City Electrical Mfg. Co.
- F. Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and connectors of one of the following:
 - 1. Allen-Stephens Conduit Fittings Corp.
 - 2. Appleton Electric Co.
 - 3. Atlas Technologies, Inc.
 - 4. Burndy Corp.
 - 5. Crouse-Hinds Co.
 - 6. Gould, Inc.
 - 7. O-Z/Gedney Co.
 - 8. RACO, Inc.
 - 9. Steel City / Midland-Ross Corp.
 - 10. Thomas and Betts Co., Inc.

PART THREE - EXECUTION

3.01 INSTALLATION OF ELECTRICAL RACEWAYS

- A. Install electrical raceways where indicated; in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and complying with recognized industry practices.
 - 1. The use of ceiling support wires or tie wires is not acceptable as support or fastening for raceways or conduit.
- B. Coordinate with other work including metal and concrete deck work, as necessary to interface installation of electrical raceways and components.
- C. Level and square raceway runs, and install at proper elevations and/or heights. Conduit shall be run parallel and perpendicular to the building construction.
 - 1. All conduit shall be installed above other trades (ductwork, piping, etc.) and supported to the structure.
 - 2. In corridors, the conduit should be installed to one or each side (either high on the wall or at structure) for accessibility.
- D. Complete installation of electrical raceways before starting installation of cables/wires within raceways.
- E. Install flexible conduit for motor connections, final connections to light fixtures, and for other electrical equipment connections where subject to movement or vibration.

- F. Install liquid-tight flexible conduit for connection of motors and for other electrical equipment in all central plants, boiler rooms, and where subject to movement and vibration (six foot maximum length), and also where subjected to one or more of the following conditions:
1. Exterior location.
 2. Moist or humid atmosphere where condensate can be expected to accumulate.
 3. Corrosive atmosphere.
 4. Subjected to water spray.
 5. Subjected to dripping oil, grease, or water.
 6. Wherever possible, install horizontal raceway runs above water and steam piping.
- G. All interior concealed conduit shall be EMT with die cast compression fittings. Use flexible metal conduit at final fixture and equipment connections only.
1. Use of rigid nonmetallic and flexible nonmetallic conduit in any interior applications is unacceptable.
 2. Final connections to lay-in light fixtures shall be made with a 6 foot maximum length of flexible conduit from a junction box to the fixture. Flexible conduit connections from fixture to fixture will not be acceptable.
 3. Install approximately twelve inches (12") maximum of flexible conduit at final connection of equipment. At exterior damp/wet locations, use PVC jacketed flexible metal conduit.
- H. For interior exposed locations such as Storage, Mechanical, and similar rooms the following shall apply:
1. Lighting and power circuits: conduit is permitted to be electrical metallic tubing (EMT).
 2. Communications (telephone, computer, EMCS, and similar) systems conduit is permitted to be EMT.
- I. For interior exposed conduit locations such as Electrical Rooms and Communications Closets the following apply:
1. Lighting and power circuits shall be EMT.
 2. Communications systems conduit shall be EMT.
- J. All concealed or exposed panel feeders and three phase motor branch circuits shall be EMT. All feeders on emergency power systems, including underground, shall be rigid steel (GRSC).
- K. Insulated bushings must be provided for all conductors number four (#4) and larger when entering or leaving a conduit. All rigid steel conduit without insulated bushings shall have malleable iron bushings.
- L. Couplings, whether threadless or not, shall be run up tight to assure electrical continuity. Conduit threads must be devoid of non-conductive coatings, and connectors must be watertight where buried in concrete or fill.
- M. Exterior exposed conduit locations shall be galvanized rigid steel GRSC.

- N. All conduit installed below grade shall be Schedule 40 PVC with rigid steel elbows.
- O. Arrange supports to prevent misalignment during wiring installation.
- P. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Supports shall be installed within 3 feet of every outlet box, junction box, panel, fitting, etc. Do not space supports further than 10 feet apart.
- Q. Group related conduits; support using conduit rack. Construct rack using steel channel.
- R. Electrical raceways shall be concealed where possible. All conduit runs shall be grouped where possible, properly supported by approved conduit or pipe hangers and run parallel or perpendicular to building lines. Where surface mounted panelboards are utilized, contractor shall mount all conduits above and below panel to Unitstrut Channels with P2900 Series Universal clamps or equal. Conduit shall be arranged in a neat and orderly manner. Failure to comply with the above will result in replacement without additional cost to the Owner.
- S. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29.
- T. Arrange conduit to maintain headroom and present neat appearance.
- U. Install insulated bushings on each end of power conduit 1-1/4 inch and larger and on all auxiliary systems conduit.
- V. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F. Wherever possible, install horizontal raceway runs above water and steam piping.
- W. Cut conduit square using saw or pipecutter; de-burr cut ends.
- X. Bends shall be made with an approved bender, and no conduit shall be installed with crimps or indenters. Where applicable, factory formed long radius ells are recommended.
- Y. Bring conduit to shoulder of fittings; fasten securely.
- Z. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- AA. Install no more than equivalent of three 90-degree bends between boxes. Use factory elbows for all 90 degree bends for conduits 1-1/4" or larger.
- BB. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- CC. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.
- DD. Provide suitable pull string in each empty conduit except sleeves and nipples.

- EE. Use suitable caps to protect installed conduit against entrance of dirt and moisture during construction.
- FF. Ground and bond conduit under provisions of Section 26 05 26.
- GG. Identify conduit under provisions of Section 26 05 33.
- HH. Provide suitable pullboxes in all conduit runs as required by the National Electrical Code and as required to facilitate wire installation.
- II. Install Products in accordance with manufacturer's instructions.
- JJ. Use manufacturer's clips and straps to fasten raceway channel to surfaces. Mount plumb and level.
- KK. Use suitable insulating bushings at connections to building raceway systems.
- LL. Provide four 3/4" empty conduit from each flush mounted branch panel board to the attic or joist space.
- MM. Flexible metal conduit shall not be smaller than 1/2" except as allowed in Article 350-3 of N.E.C. Contractor shall not use lengths longer than 6' and shall be supported as per 350-4 N.E.C. Flexible metal conduit shall not be used to go from light fixture to light fixture. Contractor shall securely anchor outlet box above each group of fixtures and then install flexible conduit to each fixture.
- NN. Conduit 1" and smaller below slab shall be installed 6" below compacted fill. Conduit larger than 1" shall be 18" below compacted fill.
- OO. Electrical contractor is responsible for installation of all conduit including power and all mechanical control systems.
- PP. Install 3/4" EMT from all T-stat locations to 6" above ceiling. Verify location with Mechanical Contractor.
- QQ. Feeders and branch circuits installed outside of building slab shall be a minimum of 24" below finished grade.

3.02 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

- A. General: Install electrical boxes and fittings where indicated or required, complying with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.
- C. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture. Weatherproof covers shall be manufactured and installed so that the device is weatherproof during use (equal to RACO).

- D. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- E. Install boxes and conduit bodies in those locations to ensure ready accessibility of electrical wiring.
 - 1. Provide each outlet box with the appropriate extension ring to suit wall thickness.
 - 2. Install boxes in a manner that preserves the Fire Resistance Ratings or shielding of partitions and other elements.
- F. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface.
- G. Outlet, pull, and junction boxes shall be of sufficient sizes to properly nest the conductors passing in and out. Size and gauge shall not be smaller than that required by the National Electrical Code. All non-weatherproof outlet boxes shall be galvanized steel. All free-standing weatherproof outlet boxes shall be cast aluminum, hub or hubless, equal to Killark FS Series. Pull and Junction Boxes shall be as noted on plans.
- H. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.
 - 1. Securely mount each outlet box to metal studs with Outlet Box Mounting Supports. If a bar or strap is used, secure to at least two metal studs.
 - 2. The use of ceiling support wires or tie wires is not acceptable as support or mounting for electrical boxes. All electrical boxes shall be independently supported to structure.
- I. Provide equipment grounding connections for all installed boxes. This connection shall be made to the back of the box with an approved green grounding screw. All grounding connections shall be made via pig tails.
- J. No more than four gangs (4 openings for a single yoke) shall be permitted. Where additional requirements dictate more than four, another box with appropriate gangs shall be installed.
- K. Insulated throats or plastic bushings shall be installed at all conduit terminations.
- L. Secure fittings to the raceways by tightening set screws to the manufacturer's recommended torque.
- M. Boxes shall not be installed back to back in the same wall. If unavoidable, then the boxes shall have void between boxes completely filled with sound attenuation mineral fiber blanket. No through-the-wall boxes or nipples between boxes are to be used. If back to back boxes are connected, make the connection with flexible metal conduit. There shall be no rigid connections.
- N. All junction and outlet boxes used shall have the circuits contained within clearly marked on the cover.
- O. All fire alarm junction boxes shall be painted red. All fire alarm junction boxes over 4-inches square shall be equipped with terminal strips (labeled) for splice connections.

- P. All communications junction boxes shall be clearly labeled with system enclosed (e.g. “Intercom”).

3.03 COORDINATION WITH OTHER TRADES

- A. All conduit shall be installed as high as possible being supported directly to bottom of structure to avoid conflicts with ductwork and piping. In corridors, conduit shall be mounted to the sides of the corridor either on the wall up high or to the structure. The electrical contractor shall coordinate installation with the mechanical contractor.

3.04 ADJUSTING AND CLEANING

- A. During installation of raceways, inspect interiors of raceways; remove burrs, dirt, and construction debris.
- B. Upon completion of installation of raceways and before conductor installation, inspect interior of raceways and swab out dirt and construction debris.
- C. Adjust flush-mounting outlets to make front flush with finished wall material.
- D. Install knockout closure in all unused box openings.

3.05 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve all partition ratings to include, but not be limited to, fire, sound, and HVAC (plenum).
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.
- C. Pullboxes shall be provided at points shown on the plans or required to overcome mechanical difficulties due to arrangement of runs or the fixed characteristics of the building construction.
- D. All threaded conduit shall be secured to boxes, cabinets, panels, etc. by means of a threaded bushing on the inside and locknutt on the box exterior and interior.
- E. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- F. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes with Architect and vendor drawings prior to rough-in.
- G. Position outlet boxes to locate luminaires as shown on reflected architectural ceiling plan.

3.06 PROHIBITED USES

- A. EMT set-screw fittings.
- B. Spray (aerosol) PVC cement.

- C. All thread nipples in other than dry locations.
- D. Wooden plugs inserted in concrete or masonry units as bases for fastening conduits, tubing, boxes, cabinets, or other equipment.
- E. Installation of conduit or tubing, which has been crushed or deformed.
- F. Torches for bending PVC conduit.
- G. LB Fittings. All bends for conduits 1-1/4" or larger shall be factory made 90 degree elbows.
- H. Wire nuts shall not be used for splicing control wiring.

END OF SECTION

IDENTIFICATION FOR
ELECTRICAL SYSTEMS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division 26 Common Work Results for Electrical section, and is part of each Division 26 section making reference to electrical identification specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of electrical identification is indicated by drawings and schedule.
- B. Types of electrical identification specified in this section include the following:
 - 1. Cable conductor identification (not including low voltage)
 - 2. Danger signs
 - 3. Equipment / system identification signs
- C. Refer to electrical general provisions sections for equipment system nameplates and performance data.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacturer of electrical identification products of types required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with not less than 5 years of successful experience in installation of raceways similar to those required for this product.
- C. NEC Compliance: Comply with NEC as applicable to installation of identifying labels and markers for wiring and equipment.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications and installation instructions for each identification material and device required. Include data substantiating that materials comply with requirements.
- B. Sample: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufactures offering identification products which may be incorporated in the work include, but are not limited to, the following:
1. Almetek Industries, Inc.
 2. Brady Co.
 3. Cole-Flex Corp.
 4. Griffolyn Company
 5. Ideal Industries, Inc.
 6. LEM Products, Inc.
 7. National Band and Tag Co.
 8. Radar Engineers Div.; EPIC Corp.
 9. Seton Name Plate Co.
 10. Tesa Corp.

2.02 ELECTRICAL IDENTIFICATION MATERIALS

- A. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.
- B. Engraved Plastic-Laminate Signs:
1. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thickness' indicated, engraved with engraver's standard letter style of sizes and wording indicated, black and white core (letter color) except as otherwise indicated, punched for mechanical fastening.
 - a. Thickness: 1/16", for units up to 20 sq. in. or 8" length; 1/8" for larger units.
 - b. Fasteners: Self-tapping stainless steel screws.

2.03 LETTERING AND GRAPHICS

- A. Coordinate names, abbreviations, and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or as required for proper identification and operation/maintenance of electrical systems and equipment. Specific wording shall be approved by the Engineer.

PART THREE - EXECUTION

3.01 APPLICATION AND INSTALLATION

A. General Installation Requirements:

1. Coordination: Where identification is to be applied to surfaces which requires finish, install identification after completion of painting.
2. Regulations: Comply with governing regulations and requirements or authorities having jurisdiction for identification of electrical work.

B. Operational Identification and Warnings:

1. Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

C. Danger Signs:

1. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about project.
 - a. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110 - 120 volts.
 - b. Critical Switches / Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

D. Equipment / System Identification:

1. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication / signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide double line of text, 1/4" high lettering on 1 - 1/2" high sign, white lettering in black field for items fed from normal power circuits. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:
 - a. Panel boards, electrical cabinets and enclosures
 - b. Electrical switchgear
 - c. Motor control centers

- d. Power transfer equipment
- e. Transformers
- f. Starters
- g. Disconnects
- h. Junction boxes larger than 8" x 8"
- i. Circuit breaker enclosures
- j. Power generating units

2. The following are sample:

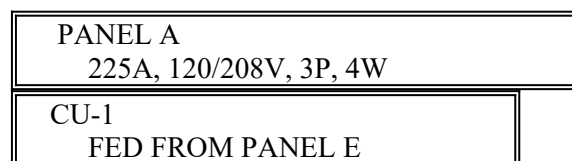
Panel	Panel XXX	XXX AMPS
xxx/xxx Volts	X Phase	X Wire

Equipment	(Equipment Name)
Panel XXX	Circuit XX

Disconnect	(Equipment Name)
Panel XXX	Circuit XX

- 3. Nameplate shall include panel or equipment designation. Include amperage, voltage, phase and wire for the panels, and "Panel fed from" for the equipment. At equipment disconnect secure nameplate (with unit designation and "Fed From Panel") to the equipment.
- 4. Nameplates shall be installed to panels, cabinets, switches, etc. with rivets or sheet metal screws. Plates attached to drywall or block on interior may be adhesive back. Embossed stick back will not be allowed.
- 5. Signs for equipment on emergency power shall be red with white letters, and signs for equipment on normal power shall be black with white letters.
- 6. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners.
- 7. Signs located at the following items shall have text which will provide manufacturing date and serial number:
 - a. Service entrance equipment
 - b. Transformers (greater than 45 KVA)
 - c. Switchgear and switchboards
 - d. Standby generators
 - e. Transfer switches
 - f. Motor control centers

Samples:



- 8. Provide available fault current stickers/labels as required by NFPA.

END OF SECTION

LOW-VOLTAGE DISTRIBUTION
TRANSFORMERS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. Division 26 Electrical sections apply to work specified in this section.

1.02 DESCRIPTION OF WORK

- A. Extent of transformer work is indicated on the drawings and in the schedules.
- B. Types of transformers in this section include the following:
 - 1. Dry-type transformers; normal loads
- C. Electrical wiring connections for transformers are specified in applicable Division 16 sections.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of power/distribution transformers of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electric power/ distribution transformer work similar to that required for this project.
- C. NEC Compliance: Comply with NEC as applicable to installation and construction of electrical power/distribution transformers.
- D. NEMA Compliance: Comply with applicable portions of NEMA Std Pub Nos. TR 1 and TR 27 pertaining to power/distribution transformers.
- E. ANSI/IEEE Compliance: Comply with applicable ANSI / IEEE standards pertaining to power/distribution transformers.
- F. ANSI/NEMA Compliance: Comply with NEMA Std. ST 20; "Dry-Type Transformers for General Applications".
- G. ANSI/UL Compliance: Comply with applicable portions of ANSI/UL 506; "Safety Standard for Specialty Transformers".

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data on power/distribution transformers, including certification of transformer performance efficiency at indicated loads, percentage regulation at 100% and 80% power factor, no-load and full load losses in watts, % impedance at 75 degrees C, hot spot and average temperature rise above 40 degrees C ambient, sound level in decibels, and standard published data.
- B. Shop Drawings: Submit dimensioned drawings of transformer installations, showing layout, mountings and supports, spatial relationship to associated equipment and panel boards, and transformer connections to electrical equipment.
- C. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data in maintenance manuals.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of transformer):
 - 1. Cutler-Hammer
 - 2. Square D Company

2.02 POWER/DISTRIBUTION TRANSFORMERS

- A. General: Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published Product information, designed and constructed as recommended by manufacturer, and as required for complete installation.
- B. Dry-Type Distribution transformers (45 KVA or less): Provide factory- assembled, general-purpose, air-cooled, dry type distribution transformers where shown; of sizes, characteristics, and rated capacities indicated; 30 KV BIL, 4.0% impedance, 115 degrees C rise. Provide primary winding with 2 taps; both 5% increments below full-rated voltage for de-energized tap-changing operation. Insulate with Class 150 insulation and rate for continuous operation at rated KVA. Limit transformer surface temperature rise to maximum of 65 degrees C. Provide terminal enclosure, with cover, to accommodate primary and secondary coil wiring connections and electrical supply raceway terminal connector. Equip terminal leads with connectors installed. Limit terminal compartment temperature to 75 degrees C when transformer is operating continuously at rated load with ambient temperature of 40 degrees C. Provide wiring connectors suitable for copper wiring. Cushion-mount transformers with external vibration isolation supports; sound-level ratings not to exceed, 45 db as determined in accordance with ANSI/NEMA standards. Electrically ground core and coils to transformer enclosure by means of flexible metal grounding strap. Provide transformers with fully-enclosed sheet steel enclosures. Apply manufacturer's standard light gray indoor enamel over cleaned and phosphatized steel enclosure. Provide transformers suitable for floor mounting with vibration isolators.

- C. Dry-Type Distribution Transformers (above 45 KVA): Provide factory-assembled, general-purpose, ventilated, dry-type distribution transformers where shown of sizes, characteristics, and rated capacities indicated; 3-phase, 60 hertz, 5.75% impedance; 115 degrees C rise. Provide primary windings with 6 taps; 2,2-1/2% increments below full rated voltage for de-energized tap-changing operation. Insulate with Class 220 insulation. Rate transformer for continuous operation at rated KVA limit transformer surface temperature rise to maximum of 65 degrees C. Provide terminal enclosure, with hinged cover, to accommodate primary and secondary coil wiring connections and electrical supply raceway terminal connector. Provide terminal board with clamp type connectors. Limit terminal compartment temperature to 75 degrees C when transformer is operating continuously at rated load with ambient temperature of 40 degrees C. Provide wiring connections suitable for copper or aluminum wiring. Integrally mount vibration isolation supports between core and coil assembly and transformer enclosure by means of flexible metal grounding strap. Do not exceed maximum sound-level standards. Provide transformers with fully-enclosed manufacturer's standard light gray outdoor enamel over a cleaned and phosphatized steel enclosure. Provide transformers suitable for floor mounting with vibration isolators.

PART THREE - EXECUTION

3.01 INSTALLATION OF TRANSFORMERS

- A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA and IEEE standards, and in accordance with recognized industry practices and ensure the products fulfill requirements.
- B. Coordinate transformer installation work with electrical raceway and wire/cable work, as necessary for proper interface.
- C. Install units on vibration mounts and a 4 inch housekeeping pad. Comply with Manufacturer's indicated installation method.
- D. Connect transformer units to electrical wiring system; comply with requirements of other Division 26 sections. Wiring connections to be in strict conformity with N.E.C.

3.02 GROUNDING

- A. Provide tightly fastened grounding and bonding connections for transformers as indicated.

3.03 TESTING

- A. Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then re-test to demonstrate compliance; otherwise, remove and replace with new units and proceed with testing.

END OF SECTION

PANELBOARDS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provision of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division - 26 Electrical and is a part of each Division – 26 section making reference to panelboards specified herein.

1.02 DESCRIPTION OF WORK:

- A. Extent of panelboard and enclosure work, including cabinets and cutout boxes is indicated by drawings and schedules.
- B. Types of panelboards and enclosures in this section include the following:
 - 1. Power-Distribution panelboards
 - 2. Lighting and appliance panelboards
- C. Refer to other Division 26 sections for cable/wire, connectors and electrical raceway work required in conjunction with panelboards and enclosures; not work of this section.

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of panelboards and enclosures, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for project.
- C. Special Use-Markings: Provide panelboards, constructed for special use, with UL marks indicating that special type usage.
- D. UL Compliance: Comply with applicable UL safety standards pertaining to panelboards and accessories, and enclosures; provide units which have been UL-listed and labeled.
- E. NEC Compliance: Comply with NEC as applicable to installation of panelboards, cabinets, and cutout boxes. Comply with NEC articles pertaining to installation of wiring and equipment in hazardous locations.
- F. NEMA Compliance: Comply with NEMA Std. Pub. No. 250, "Enclosures for Electrical Equipment (1000 volt maximum)", Pub. No. 1 "Panelboards", and installation portion of Pub. No. PB 1.1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".

- G. Federal Specification Compliance: Comply with FS W-P-115, “Power Distribution Panel”, pertaining to panelboards and accessories.

1.04 SUBMITTALS:

- A. Product Data: Submit manufacturer’s data including specifications, installation instructions and general recommendations, for each type of panelboard required. Include data substantiation that units comply with requirements.
- B. Shop Drawings: Submit dimensioned custom drawings of panelboards and enclosures showing accurately scaled layouts of enclosures and required individual panelboard devices, including but not necessarily limited to, circuit breakers, fusible switches, fuses ground-fault circuit interrupters, and accessories. Manufacturer’s standard catalog sheets are not acceptable.
- C. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data in maintenance manuals.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of panelboard and enclosure):
 - 1. Cutler-Hammer
 - 2. Square D Company

2.02 PANELBOARDS:

- A. General: Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer’s standard materials, design and construction in accordance with published product information; equip with number of unit panelboard devices as required for complete installation. Where more than one type of component meets indicated requirements, selection is Installer’s option. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for applications indicated.
- B. Power Distribution Panelboards: Provide dead-front safety type power distribution panelboards as indicated, with panel-board switching and protective devices in quantities, ratings, types and with arrangement shown; with anti-turn solderless pressure type main lug connectors approved for copper conductors. Sub-feed breakers are not allowed unless otherwise noted on the Drawings. Construct unit for connecting feeder at top of panel. Equip with copper bus bars, and full-sized neutral bus; provide suitable lugs on neutral bus for out-going feeders requiring neutral connections. Provide molded-case main circuit breaker or main lugs only (as shown on the drawings) and branch circuit breaker types for each circuit, with toggle handles that indicate when tripped. Where multiple-pole breakers are indicated, provide with internal common trip so overload on one pole will trip all poles simultaneously. Provide a bare un-insulated grounding bar bolted to enclosures. Provide panelboards fabricated by the same manufacturer as enclosures, and which mate properly with enclosures. Where specified provide isolated ground bus bar.

- C. Lighting and Appliance Panelboards: Provide dead-front safety type lighting and appliance panelboards as indicated, with switching and protective devices in quantities, ratings, types and arrangement shown; with anti-burn solderless pressure type lug connectors approved for copper conductor; construct unit for connecting feeders at top or bottom of panel as required; equip with copper bus bars, full-sized neutral bar, with bolt-in molded case circuit breakers; provide suitable lugs on neutral bus for each outgoing feeder required; provide bare un-insulated grounding bar bolted to enclosure; and provide panelboards fabricated by same manufacturer as enclosures; and which mate properly with enclosures. Where specified provide isolated ground bus bar. The branch circuit breaker sub-assembly shall be in continuous contact and bolted to the panel enclosure back-box; sub-assemblies mounted on “Z” brackets are not allowed. The circuit breaker sub-assembly shall utilize thermo-plastic mounting straps to properly align breakers.
- D. Panelboard Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gauge, minimum 16-gauge thickness. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable indicating trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed door hinges and door swings as indicated. equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor. Design enclosure for surface or recessed mounting as indicated on the drawings. Provide enclosures fabricated by same manufacturer as panelboards, and which match properly with panelboards to be enclosed.
- E. Panelboard Accessories: Provide panelboard accessories and devices including, but not necessarily limited to circuit breakers, ground-fault protection units, etc., as recommended by panelboard manufacturer for ratings and applications indicated.

PART THREE - EXECUTION

3.01 INSTALLATION OF PANELBOARDS:

- A. General: Install panelboards and enclosures where indicated, in accordance with manufacturer’s written instructions applicable requirements of NEC and NECA’s “Standard of Installation”, and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Coordinate installation of panelboards and enclosures with cable and raceway installation work.
- C. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.
- D. Provide electrical connections within enclosures.
- E. Circuit breakers shall be quick-make, quick-break, thermal magnetic trip indicating, and have common trip on all multipole breakers. Handle ties will not be accepted. All panelboards and circuit breakers shall be fully rated to AIC rating as noted on drawings. (No series rating allowed.)
- F. All sub-feed breakers shall be connected to line side of main circuit breaker.

- G. All circuit breakers shall be in proper sequence according to panel schedule. Factory rearranged sequence will not be accepted.
- H. Each panelboard shall be labeled with a bakelite name tag indicating voltages, phase, and wire, and panelboard identification. See Identification Section. Each circuit shall be identified by numbers furnished by factory as 1 thru 42 or 1 thru 84 in 2 section panelboards. Any change or alteration in numbering shall be corrected by contractor at his expense.
- I. Fill out (typewritten) panelboard's circuit directory card upon completion of installation work.
- J. Provide identification as required by Section 26 05 53 and as required by the National Electrical Code.
- K. Provide a minimum of six (6) spare circuit breakers (or more if indicated on the Drawings) in each panelboard and install a minimum of six (6) spare 3/4" conduits from each flush mounted panelboard/load center to above an accessible ceiling.
- L. External handle tie type circuits breakers are not acceptable.
- M. Main Circuit Breakers "MCB" shall be Separate Vertically Factory Mounted on bus bars and not "back-fed" branch style. Service Entrance Main Breakers shall also have barriers to comply with UL 67 and NEC 230.

END OF SECTION

WIRING DEVICES

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division 26 – Electrical and is part of each Division 26 section making reference to wiring devices specified herein.

1.02 DESCRIPTION OF WORK

- A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electrical energy.
- B. Types of electrical wiring devices in this section include the following:
 - 1. Receptacles.
 - 2. Switches.
 - 3. Wall plates
 - 4. Dimmer controls.
 - 5. Attachment plug.
 - 6. Plug connectors.
 - 7. Floor and counter-top service outlets.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in Manufacturer of wiring devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for this project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring devices.
- D. Compliance and Labeling: Provide electrical wiring devices which have been listed and labeled by a nationally recognized testing facility engaged in and equipped to test electrical equipment and materials.
- E. NEMA Compliance: Comply with NEMA standards for general and specific-purpose wiring devices.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data on electrical wiring devices.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of wiring device):
1. Eaton
 2. Hubbell Inc.
 3. Leviton

2.02 FABRICATED WIRING DEVICES

- A. General: Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and complying with NEMA Stds Pub No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Architect/Engineer to fulfill wiring requirements, and complying with NEC and NEMA standards for wiring devices. All devices shall have side wired screw terminals.
- B. Receptacles:
1. Commercial Specification Grade Duplex: Provide duplex commercial specification grade type receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke, 20-amperes, 125-volts, with metal plaster ears, nylon face, NEMA configuration 5-20R unless otherwise indicated. Hubbell 5362.
 2. Ground-Fault Interrupter: Provide commercial specification grade, duplex receptacle, 2-pole, 3-wire, grounding type UL-rated Class A, Group 1, 20-amperes rating, 120-volts, 60 Hz; with solid-state ground-fault sensing and signaling; with 5 milliamperes ground-fault trip level; equip with 20 ampere plug configuration, NEMA 5-20R. Hubbell GF 5362.
 4. Receptacle, duplex, Leviton 5362*
Receptacle, duplex, WP, Leviton G5362-WT* with TAYMAC MX4280S cover
Receptacle, ground fault interrupter, Leviton 7899-SG*
Receptacle, 2 pole, 3 wire, 20A, 250V, Leviton 5461
Receptacle, 3 pole, 4 wire, 30A, 250V, Leviton 278
Receptacle, 3 pole, 4 wire, 50A, 250V, Leviton 279
Receptacle, surge suppressor, Leviton 5380-* or 5380IG
Receptacle, commercial grade, tamper-resistant, 5362-SG*
Receptacle, commercial grade, GFCI, tamper Resistant, G5362-WT*
Receptacle, USB Combo, USB20AC5*
Receptacle, clock outlet, Leviton 5361-CH

C. Plugs and Connectors:

1. Plugs: Provide grounding, armored cap plugs with cord clamp, and 0.4" cord hole; match NEMA configuration ampacity, voltage and wire quantity with power sources.

D. Switches:

1. Single Pole: Provide commercial specification grade flush single-pole quiet toggle switches, 20-ampere, 277-volts AC, with mounting yoke insulated from mechanism, equip with plaster ears, and switch handle. Hubbell HBL 1221.
2. 3-way Snap: Provide commercial specification grade flush 3-way quiet switch, 20-amperes, 277 volts, with mounting yoke insulated from mechanism, equip with plaster ears, and switch handles. Hubbell HBL 1223.
3. Four-Way: Provide commercial grade flush four-way quiet toggle switches, 20-amperes, 277-volt AC, with mounting yoke insulated from mechanism, equip with plaster ears, and switch handle. Hubbell HBL 1224.

Switch, single pole (S), Leviton CS120-2*

Switch, double pole (S2), Leviton CS220-2*

Switch, three way (S3), Leviton CS320-2*

Switch, four way, (S4) Leviton CS420-2*

Switch, single pole, pilot light (Sp), Leviton 1221-PLR

Switch, interchangeable (SIC), Arrow Hart QST91* or QST93*

E. Dimmers:

1. Single Pole Dimmers: Provide branch lighting solid-state AC dimmer controls for fixtures; wattage as indicated, 120-volts, 60 hertz, with continuously linear slide dimmer, nylon face plate, single-pole, soft-touch ON-OFF switch. Lutron Nova N-2000, Lutron NLV-1500 (low voltage application) or approved equal. Provide 0-10V dimmers equal to Lutron for 0-10V LED circuits.

2.03 WIRING DEVICE ACCESSORIES

- A. Wall Plates: Provide switch and duplex outlet wall plates for wiring devices, of types, sizes, and with ganging and cutouts as indicated. Where more than one device occurs, provide single piece-plates with appropriate cutout. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates; all plates shall be thermo-plastic. All non-weatherproof cover plates shall be Leviton nylon plates, color as noted by Architect. Provide horizontal or vertical gang plates where more than one device is concurrent at the same elevation or location. For interchangeable door mullion switches use narrow cover plates as manufactured by Arrow-Hart T-1650. Furnish blank plates for outlets without a device. All non-weatherproof cover plates throughout project shall be of the same material, color, finish and design and shall match any existing device cover plates as directed by architect.
- B. Floor and Countertop Service Outlets: Provide service receptacle outlets and fittings of types and ratings indicated on the Drawings. All floor boxes installed in slab on grade shall be cast iron and floor boxes installed in slab above grade shall be stamped steel as manufactured by Legrand.

PART THREE - EXECUTION

3.01 INSTALLATION OF WIRING DEVICES

- A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other work, including painting, electrical box and wiring work, as necessary to interface installation of wiring devices with other work.
- C. Install wiring devices only in electrical boxes which are clean; free from excess building materials, dirt, and debris.
- D. Tighten connectors terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torque's specified in UL standard 486A. Use properly scaled torque indicating hand tool.
- E. Delay installation of wiring devices until wiring work is completed.
- F. Delay installation of wall plates until after wall finish completed. This Contractor shall remove and re-install plates for painting contractor.
- G. Mounting Heights: (to centerline):

Receptacles	18" above finish floor unless otherwise noted
Switches	48" above finish floor to top of box unless otherwise noted
- H. All outlets shown to be mounted above counter shall be mounted accessible. Exact location above counter and mounting configuration shall be coordinated with Architect and Architectural millwork details.
- I. Install switches with off position down, and install all devices plumb and square.
- J. Where receptacles occur where built-in cabinets or table tops exist, they shall be installed above working surfaces as directed. All receptacles to have grounding slots below parallel slots.
- K. Switches for use on 277 volt system, grouped in outlet boxes shall have a permanently installed shield as directed by N.E.C.
- L. Connect wiring devices by wrapping conductor around side mounted screw terminal. Back-wired connections will not be acceptable.
- M. Use jumbo size plates for devices in masonry walls.

- N. All floor outlets to be installed from an approved shop drawing. Locations shown for bidding purposes only. Floor boxes shall be equal to Legrand RFB6-OG unless indicated otherwise on plans. Provide Metallic carpet/tile flange as directed by architect. Nonmetallic covers are not acceptable.
- O. All receptacles installed within 6' of any sink, hose bibb or other water source shall be of the GFI type as specified above. Any receptacle installed on the exterior of the building or outdoors shall be the GFI type.
- P. Use of feed-thru GFI protection is not allowed.

3.02 PROTECTION OF WALL PLATES AND RECEPTACLES

- A. Upon installation of wall plates and receptacles, advise contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.03 GROUNDING

- A. Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated. Device grounding connection shall be made via a pig tail from the ground screw within the device backbox. Install in strict accordance with NEC Article 300-13 (b).

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights specified and indicated on Drawings.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor except surface mounted devices shall be mounted on top on baseboard.
- D. Install convenience receptacle 6 inches above counter unless noted otherwise.
- E. Install telephone and computer outlets 18 inches above finished floor except surface mounted devices shall be mounted on top of baseboard.
- F. Install fire alarm audio/visual and visual devices 6'-8" above finish floor.
- G. Install fire alarm pull station 4'-0" above finish floor.

3.05 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.

- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

END OF SECTION

OVERCURRENT PROTECTIVE DEVICES

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Materials and Methods section, and is part of each Division-26 section making reference to Overcurrent Protective Devices specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of overcurrent protective device work is indicated by drawings and schedules.
- B. Types of overcurrent protective devices in this section include the following:
 - 1. Circuit breakers.
 - 2. Fuses
- C. Refer to other Division-16 sections for cable-wire and connector work required in conjunction with overcurrent protective devices; not work of this section.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in Manufacture of overcurrent protective devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for this project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of overcurrent protective devices.
- D. NEMA Compliance: Comply with applicable requirements of NEMA Std Pub Nos. AB 1 and SG 3 pertaining to molded-case and power type circuit breakers.
- E. ANSI Compliance: Comply with applicable requirements of ANSI C97.1 pertaining to low-voltage cartridge fuses.
- F. Compliance and Labeling: Provide overcurrent and grounding devices which have been listed and labeled by a nationally recognized testing facility engaged in and equipped to test electrical equipment and materials.

1.04 SUBMITTALS

- A. Product data: Submit manufacturer's data on overcurrent protective devices, including catalog cuts, time-current trip characteristic curves, and mounting requirements.
- B. Maintenance Stock, Fuses: For types and ratings required, furnish additional fuses, amounting to one set for each type and kind installed.
- C. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data in maintenance manuals.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type and rating of overcurrent protective device):

- 1. *Circuit Breakers:

- a. Cutler-Hammer
 - b. Square D Company

- *Circuit breakers installed in existing equipment shall match existing equipment type, manufacturer, rating, etc.

- 2. *Fuses:

- a. CEFCO - Commercial Enclosed Fuse Co., Inc.
 - b. Chase-Shawmut
 - c. Bussmann Mfg. Co.

- *Fuses installed in existing equipment shall match existing equipment type, manufacturer, rating, etc.

2.02 CIRCUIT BREAKERS

- A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for a complete installation. All circuit breakers serving elevator power, elevator controls, and elevator cab lighting shall be shunt trip type circuit breakers.
- B. Molded-Case Circuit Breakers: Provide factory-assembled, molded-case circuit breakers with a maximum rating of 400 amperes, 250 or 600-volts, 60 HZ, 1 to 3 poles with symmetrical interrupting ratings as indicated on the drawings. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole, and with fault-current limiting protection, ampere ratings as indicated. Construct with over-center, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Provide push-to-trip button on cover for mechanically tripping circuit breakers. Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40 degrees C. Provide with mechanical screw type removable connector lugs, AL/CU rated.

C. Electronic Trip Circuit Breakers With Standard Function Trip System:

1. Shall be Square D Standard Function type: LX, MX, NX, PX, or current limiting Standard Function type LXI or approved equal.
2. Circuit breaker trip system shall be a microprocessor-based true rms sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on the associated schedules and drawings.
3. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
4. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and adjustment positions shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 80% of their ampere rating continuously.
5. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.
 - a. Long Time Pickup
 - b. Instantaneous Pickup
 - c. Long Time Delay
 - d. Short Time Pickup
 - e. Short Time Delay
 - f. Ground Fault Pickup – If indicated on the Drawings
 - g. Ground Fault Delay - If indicated on the Drawings
6. A means to seal the trip unit adjustments in accordance with NEC Section 240-6(b) shall be provided.
7. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
8. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. [Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection]. All current values shall be displayed in true rms with 2% accuracy.
9. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
10. The trip system shall include a Long Time memory circuit to sum the time increments of intermittent overcurrent conditions above the pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.
11. Circuit breakers (except LX, LXI) shall be equipped with back-up thermal and magnetic trip system.
12. Circuit breaker trip system shall be equipped with an externally accessible test port for use with a Universal Test Set. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

2.03 FUSES

- A. General: Except as otherwise indicated, provide fuses of types, sizes and ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, and construction in accordance with published product information, and with industry standards and configurations.
- B. Class L Fuses: Provide NEMA Class L fuses in current ratings indicated, for service entrances, main and feeder circuits, busways and motor control centers.

- C. Class J (K-5) Fuses: Provide NEMA Class J (K-5), dual-element types, with time delay of 10 seconds at 500% of rating, for use with switches.

PART THREE - EXECUTION

3.01 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.
- D. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cables.
- E. Set field-adjustable circuit breakers for trip settings as indicated, subsequent to installation of devices.
- F. All breakers with trip settings greater than 400 ampere or greater shall be electronic trip type breakers unless otherwise noted on the Drawings.
- G. Main Circuit Breakers "MCB" shall be Separate Vertically Factory Mounted on bus bars and not "back-fed" branch style. Service Entrance Main Breakers shall also have barriers to comply with UL 67 and NEC 230.

3.02 ADJUST AND CLEAN

- A. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

3.03 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specification sections, apply to work of this section.
- B. This section is a Division – 26 Electrical and is a part of each Division 26 section making reference to motor and circuit disconnect switches specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of Enclosed Switches And Circuit Breakers work is indicated by drawings and schedules.
- B. Types of motor and circuit disconnect switches in this section include the following:
 - 1. Equipment disconnects
 - 2. Appliance disconnects
 - 3. Motor-circuit disconnects
 - 4. Overcurrent Protective Devices

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of motor and circuit disconnect switches of types, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical motor and circuit disconnect switches. Comply with applicable requirements of NEMA Std Pub Nos. AB 1 and SG 3 pertaining to molded-case and power type circuit breakers.
- D. UL Compliance and Labeling: Provide motor and circuit disconnect switches which have been UL-listed and labeled. Provide overcurrent and grounding devices which have been listed and labeled by a nationally recognized testing facility engaged in and equipped to test electrical equipment and materials.
- E. NEMA Compliance: Comply with applicable requirements of NEMA Standards Pub. No. KS 1.
- F. ANSI Compliance: Comply with applicable requirements of ANSI C97.1 pertaining to low-voltage cartridge fuses.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data including specifications, installation instructions and general recommendations, for each type of motor and circuit disconnect switch required. Submit manufacturer's data on overcurrent protective devices, including catalog cuts, time-current trip characteristic curves, and mounting requirements.
- B. Shop Drawings: Submit dimensioned drawings of electrical motor and circuit disconnect switches which have ratings of 100 amperes and larger, showing accurately scaled switches, their layouts and proximity to associated equipment.
- C. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data in maintenance manuals.
- D. Maintenance Stock, Fuses: For types and ratings required, furnish additional fuses amounting to one (1) set for every 10 installed units, but not less than five (5) sets of each type.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of switch):

- 1. Switches/Circuit Breakers*:

- a. Cutler-Hammer
- b. Square D Company

*Circuit breakers installed in existing equipment shall match existing equipment type, manufacturer, rating, etc.

- 2. Fuses**:

- a. CEFCO - Commercial Enclosed Fuse Co., Inc.
- b. Chase-Shawmut
- c. Bussmann Mfg. Co.

**Fuses installed in existing equipment shall match existing equipment type, manufacturer, rating, etc.

2.02 FABRICATED SWITCHES

- A. Disconnect Switches: Provide surface mounted (Heavy Duty Horse Power Rated) type switches with sheet steel indoor NEMA-1 or outdoor NEMA-3R enclosures as required, rated 240 volts for 208 and 240 volt circuits and 600 volts for 440, 480 and 600 volt circuits; ampere rating, ground lug, number of poles and solid neutral connection as indicated; fused or non-fused as indicated; incorporating spring assist, quick make, quick break mechanism constructed so that the switch blades are visible in the "OFF" position with the door open. Equip with operating handle, mechanically interlock with the door to prevent access in the "ON" position and which position is easily recognizable and is capable of being padlocked in the "OFF" position. Current carrying parts shall be of 98% conductive copper; switch contacts shall be of silver-tungsten; fuse clips shall be reinforced positive pressure type designed to accept Class R rejection type fuses. Safety switches shall conform to governing industry NEMA Standards, heavy duty. They shall be listed by Underwriters Laboratories, Inc., where applicable. All safety switches shall be metallic with front operated with factory enamel finishes. All switches shall be either NEMA TYPE 1 or 3R, depending on moisture conditions or direct exposure to exterior conditions. Furnish complete with equipment ground kits.
- B. Fuses shall be UL, Class RKI dual element, time delay Class R rejection type, current limiting with 200,000 amperes interrupting capacity. Ampere rating shall be noted on the drawings or 125 percent of the load name plate rating. All fuses shall be of the same manufacturer to maintain selectivity.

2.03 CIRCUIT BREAKERS

- A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for a complete installation. All circuit breakers serving elevator power, elevator controls, and elevator cab lighting shall be shunt trip type circuit breakers.
- B. Molded-Case Circuit Breakers: Provide factory-assembled, molded-case circuit breakers with a maximum rating of 400 amperes, 250 or 600-volts, 60 HZ, 1 to 3 poles with symmetrical interrupting ratings as indicated on the drawings. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole, and with fault-current limiting protection, ampere ratings as indicated. Construct with over-center, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Provide push-to-trip button on cover for mechanically tripping circuit breakers. Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40 degrees C. Provide with mechanical screw type removable connector lugs, AL/CU rated.
- C. Electronic Trip Circuit Breakers With Standard Function Trip System:
 - 1. Shall be Square D Standard Function type: LX, MX, NX, PX, or current limiting Standard Function type LXI or approved equal.
 - 2. Circuit breaker trip system shall be a microprocessor-based true rms sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on the associated schedules and drawings.

3. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
4. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and adjustment positions shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 80% of their ampere rating continuously.
5. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.
 - a. Long Time Pickup
 - b. Instantaneous Pickup
 - c. Long Time Delay
 - d. Short Time Pickup
 - e. Short Time Delay
 - f. Ground Fault Pickup – If indicated on the Drawings
 - g. Ground Fault Delay - If indicated on the Drawings
6. A means to seal the trip unit adjustments in accordance with NEC Section 240-6(b) shall be provided.
7. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
8. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. [Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection]. All current values shall be displayed in true rms with 2% accuracy.
9. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
10. The trip system shall include a Long Time memory circuit to sum the time increments of intermittent overcurrent conditions above the pickup point. Means shall be provided to reset Long Time memory circuit during primary injection testing.
11. Circuit breakers (except LX, LXI) shall be equipped with back-up thermal and magnetic trip system.
12. Circuit breaker trip system shall be equipped with an externally accessible test port for use with a Universal Test Set. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

2.04 FUSES

- A. General: Except as otherwise indicated, provide fuses of types, sizes and ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, and construction in accordance with published product information, and with industry standards and configurations.
- B. Fuses of 600A capacity and below serving circuit breaker panels shall be Bussman KTN or KTS Limitron fast acting fuse. Fuses of greater capacity shall be Bussman dual element FRN and FRS Fustrons.
- C. Class L Fuses: Provide NEMA Class L fuses in current ratings indicated, for service entrances, main and feeder circuits, busways and motor control centers.

- D. Class J (K-5) Fuses: Provide NEMA Class J (K-5), dual-element types, with time delay of 10 seconds at 500% of rating, for use with switches.

PART THREE - EXECUTION

3.01 INSTALLATION OF MOTOR AND CIRCUIT DISCONNECT SWITCHES

- A. Install motor and circuit disconnect switches where indicated complying with manufacturer's written instructions, applicable requirement of NEC, NEMA, and NECA's "Standard of Installation" and in accordance with recognized industry to ensure that products fulfill requirements.
- B. Coordinate motor and circuit disconnect switch installation work with electrical raceway and cable work, as necessary for proper interface.
- C. Install disconnect switches used with motor-driven appliances, and motors and controller within sight of controller position unless otherwise indicated.
- D. Provide identifications required by Section 26 05 53.

3.02 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.
- E. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cables.
- F. Set field-adjustable circuit breakers for trip settings as indicated, subsequent to installation of devices.
- G. All breakers with trip settings greater than 400 ampere shall be electronic trip type breakers unless otherwise noted on the Drawings.
- H. Main Circuit Breakers "MCB" shall be Separate Vertically Factory Mounted on bus bars and not "back-fed" branch style. Service Entrance Main Breakers shall also have barriers to comply with UL 67 and NEC 230.

3.03 ADJUST AND CLEAN

- A. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

3.04 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION

ENCLOSED CONTROLLERS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One Specifications sections, apply to work of this section.
- B. This section is a Division 26 Electrical and is part of each Division 26 section making reference to motor starters and/or enclosed controllers specified herein.

1.02 DESCRIPTION OF WORK

- A. Extent of motor starter work is indicated by drawings and schedules.
- B. Types of motor starter work are indicated by drawings and schedules and include (but are not limited to) the following:
 - 1. Manual with overload protection.
 - 2. Full voltage, non-reversing starters
 - 3. Full voltage, non-reversing combination starters/disconnect switches

1.03 QUALITY ASSURANCE

- A. Manufacturer: Firms regularly engaged in manufacturer of motor starters, of types, ratings and characteristics required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for the project.
- C. NEC Compliance: Comply with NEC as applicable to wiring methods, construction and installation of motor starters.
- D. UL Compliance and Labeling: Comply with applicable requirements of UL 508, "Electric Control Equipment", pertaining to electrical motor starters. Provide units which have been UL-listed and labeled.
- E. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to motor controllers/starters and enclosures.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data on motor starters.
- B. Shop Drawings: Submit dimensioned drawings on motor starters showing accurately scaled equipment layouts and spatial relationship to associated motors, and connections to electrical power feeders and panels. All accessory components shall be clearly outlined and identified.

- C. Maintenance Data: Submit maintenance instructions for motor and drive replacements and spare parts listed. Include this data in maintenance manuals.
- D. Maintenance Stock, Fuses: For types and ratings required, furnish additional fuses, amounting to one unit for every 10 installed units, but not less than 5 units of each. Fuses shall be of a type available from a least two manufacturers.
- E. Maintenance Stock, Heaters; For types and ratings required, furnish additional heaters, amounting to one unit for each nine installed, but not less than three units of each.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type and rating of motor starter):
 - 1. Cutler Hammer
 - 2. Square D Co.

2.02 MOTOR STARTERS

- A. General: except as otherwise indicated, provide motor starters and auxiliary components; of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installations. Where more than one type of equipment meets indicated requirements, selection is Engineer's option. Provide phase loss and low voltage protection relay in the control circuits of all motors 7-1/2 HP and larger. Size 0 Starters shall be supplied as a minimum. Size 0 starters shall be provided in an oversized enclosure for control wiring. Combination units shall be provided with integral non-fused disconnect or circuit breaker as indicated on the Drawings. Starters installed in existing motor control centers shall match existing equipment type, rating, etc.
- B. AC Fractional HP Manual Starters: Provide manual single-phase fractional HP motor starters of types, ratings and electrical characteristics indicated; equip with thermal overload relay for protection of 120 V AC motors of 1/2 HP and less. Provide starters with quick-make, quick-break trip free toggle mechanisms; mount starter in NEMA Type I general purpose enclosure.
- C. AC Full Voltages: Provide full voltage alternating current magnetic starters, consisting of contactors and overload relays mounted in common enclosures; of type, size, ratings and NEMA sizes indicated. Overload relays to be block type with manual reset. Control voltage to be supplied via 120 volt control transformer with fused primary and fused secondary and with a minimum of two sets of auxiliary contacts, (two-NO and two-NC) or as required for controls specified. Provide other control components as listed below and as directed by applicable Sections in Division 26.
 - 1. Green power off pilot light.
 - 2. Red power on pilot light.
 - 3. H-O-A selector switch.

PART THREE - EXECUTION

3.01 INSTALLATION OF MOTOR STARTERS

- A. Install motor starters as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NEMA standards, and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Install fuses in fusible disconnects, if any.
- C. Install heaters, sized to provide protection in accordance with the manufacturer's recommendations and the NEC in overload relays.
- D. Coordinate auxiliary control requirements with mechanical contractor and application Section of Division 23.
- E. Provide identification as required by Section 26 05 53.

3.02 ADJUST AND CLEAN

- A. Inspect operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.
- B. Touch-up scratched or marred surfaces to match original finish.

3.03 FIELD QUALITY CONTROL

- A. Subsequent to wire/cable hook-up, energize motor starters and demonstrate functioning of equipment in accordance with requirements.

END OF SECTION

INTERIOR LIGHTING

PART ONE – GENERAL

1.1 SCOPE

- A. The work under this section includes interior luminaires and accessories, exit signs, and building-mounted exterior lighting. Included are the following topics:

1.2 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.
Section 26 27 26 – Wiring Devices

1.3 REFERENCE STANDARDS

- A. LM-79-08 (or latest) – IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
- B. LM-80-08 (or latest) – IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- C. NEMA SSL 1-2010 (or latest) – Electronic Drivers for LED Devices, Arrays, or Systems.

1.4 SUBMITTALS

- A. Include outline drawings, luminaire and driver data, support points, weights, accessory information and performance data for each luminaire type.
- B. For each luminaire type, submit luminaire information including catalog cuts with highlighted catalog numbers and required accessories:
 - 1. Luminaire:
 - a. Manufacturer and catalog number,
 - b. Type (identification) as indicated on the plans and schedule,
 - c. Delivered lumens,
 - d. Input watts,
 - e. Efficacy,
 - f. Color rendering index.
 - 2. Driver:
 - a. Manufacturer and catalog number,
 - b. Type (Non-Dimming, Step-dimming, Continuous dimming, etc.),
 - c. Power Factor, Crest Factor, THD, etc.

1.5 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.6 DEFINITIONS

- A. Driver: The power supply used to power LED luminaires, modules, or arrays.
- B. L70, L₇₀, or L₇₀?: The reported life of an LED component or system to reach 70% lumen maintenance, or 70% of the LED's original light output. This test is being developed by the IES and is currently described by TM-21-11.
- C. LED's: Broadly defined as complete luminaire with light emitting diode (LED) packages, modules, light bars or arrays, complete with driver.
- D. LED luminaire failure: Negligible light output from more than 10 percent of the LED's constitutes luminaire failure.

PART TWO - PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES

- A. See the Luminaire Schedule on the drawings for type of luminaires and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Luminaires manufactured by others are equally acceptable (unless otherwise note on drawings) provided they meet or exceed the performance of the indicated luminaires, and meet the intent of the design.
- B. Luminaire shall be listed by a NRTL (Nationally Recognized Testing Laboratory: e.g. UL, ETL, etc.).
- C. Provide luminaires with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.

2.2 GENERAL USE LAMPS

- A. General Use Incandescent Lamps and Incandescent Reflector Lamps are prohibited.

2.3 LED LUMINAIRES

- A. LED Luminaires shall meet all DesignLights Consortium® (DesignLights.org) Product Qualification Criteria. This does not require that the luminaire be listed on the DesignLights Consortium's® Qualified Products List, but they must meet the Product Qualification Criteria. The technical requirements that the luminaire shall meet for each Application Category are:
 - 1. Minimum Light Output.
 - 2. Zonal Lumen Requirements.
 - 3. Minimum Luminaire Efficacy.
 - 4. Minimum CRI.
 - 5. L70 Lumen Maintenance.

6. Minimum Luminaire Warranty of 5 years (not pro-rated) to include LED driver and all LED components.

Additional requirements:

1. Color Temperature of 3000K-4100K for interior luminaires as listed in the Luminaire Schedule on the plans. The color temperature of exterior LED luminaires should not exceed 4100K (nominal).
2. Color Consistency: LED manufacturer shall use a maximum 3-step MacAdam Ellipse binning process to achieve consistent luminaire-to-luminaire color for interior luminaires. Exterior luminaires shall use a maximum 5-step MacAdam Ellipse binning process.
3. Glare Control: Exterior luminaires shall meet DesignLights Consortium's® criteria for Zonal Lumen Distribution requirements or Backlight-Uplight-Glare (BUG) standards for exterior luminaires.
4. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
5. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
6. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
7. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
8. Lumen output shall not depreciate more than 20% after 10,000 hours of use.
9. Luminaire and driver shall be furnished from a single manufacturer to ensure compatibility.
10. Luminaire Color Rendering Index (CRI) shall be a minimum of 80 for interior luminaires, and a minimum of 70 for exterior luminaires.
11. LED luminaire shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the luminaire is to be installed. Rated case temperature shall be suitable for operation in the ambient temperatures typically found for the intended installation. Exterior luminaires to operate in ambient temperatures of -20°F to 122°F (-29°C to 50°C).
12. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent.
13. Luminaire shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.
14. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
15. All luminaires shall be provided with knockouts for conduit connections.
16. The LED luminaire shall carry a limited 5-year warranty minimum for LED light engine(s)/board array, and driver(s).
17. Provide all of the following data on submittals:
 - a. Delivered lumens
 - b. Input watts
 - c. Efficacy
 - d. Color rendering index.

LED Luminaires used for Emergency Egress Lighting:

1. The failure of one LED shall not affect the operation of the remaining LEDs.

Emergency LED Luminaire Compatibility with Inverters:

1. Emergency Inverters shall be sine-wave type, or have written confirmation from the luminaire manufacturer that the luminaire will function with a square-wave inverter.

2.4 LED DRIVERS

A. General:

1. Provide driver type (non-dimmed, step-dimmed, continuous-dimming, etc.) as indicated on the luminaire schedule on the drawings.
2. Minimum Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
3. Driver shall have a rated life of 50,000 hours, minimum.
4. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
5. Driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full input power and across specified voltage range.
6. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
7. Driver shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.
8. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
9. Provide all of the following data on submittals:
 - a. Input watts
 - b. Power Factor (pf)
 - c. Crest Factor (cf) at full input power
 - d. Total Harmonic Distortion (THD).

B. Dimming Drivers:

1. LED driver shall be compatible with dimming controls where dimming is indicated on the plans. Dimmable drivers shall use Dimming Constant Current (DCC), Constant Voltage, or Pulse Width Modulation (PWM) operation.
2. Step-Dimming Drivers: Easily switched from 0% to 50% to 100% output power. Both switch-leg inputs shall control 50% of the luminaire's light output equally.
3. Continuous Dimming Drivers: LED luminaires shall dim to (10%, 1%, or 0.1%) as specified in the Luminaire Schedule on the plans without visible flicker or "popcorn effect". "Popcorn effect" is defined as the luminaire being on a pre-set dimmed level (less than 100%), and going to 100% prior to returning to the pre-set level when power is returned to the luminaire. Continuous Dimming Drivers shall use 0-10V control.

PART THREE - EXECUTION

3.1 INSTALLATION

- A. Verify ceiling types with Architectural plans or with existing ceilings. Verify specified luminaires are compatible with specified ceiling type(s) prior to ordering luminaires.
- B. Install in accordance with manufacturer's instructions.
- C. Install suspended luminaires using aircraft cable, or pendants supported from swivel hangers. Heavy duty chain supports may be used where indicated on the luminaire schedule. Provide aircraft cable, pendants, or chain lengths required to suspend luminaire at indicated height. All aircraft cables or pendant supported luminaires shall have an independent support to structure at all cable or pendant support locations. When chain is used, tie-wrap the luminaire wiring method to the chain.
- D. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- E. Provide independent support for all luminaires over 50 lbs.
- F. Locate ceiling luminaires as indicated on reflected ceiling plan.
- G. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
- H. The Contractor shall install luminaire supports as required. Luminaire installations with luminaires supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all luminaires adequately, providing extra steel work for the support of luminaires if required. Any components necessary for mounting luminaires shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.
- I. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- L. Install code required hardware to secure recessed grid-supported luminaires in place.
- M. Install wall mounted luminaires and exit signs at height as scheduled. Use pendants supported from swivel hangers in exposed ceiling/structure locations where necessary to mount exit signs at the specified height.
- N. Install accessories furnished with each luminaire.
- O. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

- P. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.
- Q. Install specified lamps in each luminaire and exit sign.
- R. LED High-Bay or Low-Bay Luminaires: Use power hook hangers rated 500 pounds (225 kg) minimum and provide safety chain between luminaire and structure.
- S. Dimmed luminaire circuits shall have separate neutrals.
- T. Dimmed LED luminaires shall have a positive OFF, which requires turning off the circuit to the luminaire so that the luminaires don't "glow" at the lowest dimmed setting. This shall be accomplished using a switch, relay, or some other means acceptable to DFD.
- U. All luminaires shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Luminaires shall be taken directly from the cartons and installed with special care so that they do not become dusty and are not soiled in the operation.
- V. All new luminaires shall be operational at the Substantial Completion of the project.

3.2 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.
- C. Touch up luminaire finish at completion of work.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Interface with air handling accessories furnished and installed under Division 23.
- B. Provide controls as indicated on the plans. Refer to Section 26 27 26 - Wiring Devices and Section 26 09 23 – Lighting Control Devices. Controls shall be compatible with the luminaires /drivers being installed.

3.4 ZERO-TO-10V DIMMING CONTROL WIRING INSTALLATION

- A. Zero-to-10V dimming control conductors are classified by the NEC as Class 2 conductors and shall be kept separate from line-voltage conductors per NEC 725.136(A). Matching the insulation rating of Conductors of Different Systems does not apply to Class 2 conductors per NEC 300.3(C)(1), Informational Note No.1.
- B. Wall box dimmers will typically have two conduits: One conduit for line-voltage power, and one conduit or conduit stub for the 0-10V control wiring.

- C. At each luminaire, separate openings (either manufactured knock-outs or punched openings) shall be used for the line-voltage power and the 0-10V wiring. The EC shall use a cable connector at the opening for the 0-10V wiring. Zero-to-10V conductors entering and within a luminaire enclosure shall maintain a minimum separation of 6 mm (0.25 in.) per NEC 725.136(D).
- D. Exposed 0-10V cables shall be installed in separate conduits from line-voltage conductors.
- E. The 0-10V cables may be routed in free air where concealed above accessible ceilings. Cables routed in free air shall observe the following installation requirements:
 - 1. The 0-10V cables may be tie-wrapped to the outside of the luminaire power raceway where allowed by NEC 300.11(B)(2). Tie-wraps shall be UL listed for UV resistance. Care should be taken in the use of cable ties to secure and anchor the cabling. Ties shall not be over tightened as to compress the cable jacket. No sharp burrs shall remain where excess length of the cable tie has been cut.
- F. Cabling shall be neatly run at right angles and be kept clear of other trades work.
- G. Cabling shall be secured within twelve (12) inches of direction change or termination.
- H. Cabling shall be supported at a maximum of 5-foot intervals utilizing “J-Hook” or “Bridle Ring” supports anchored to ceiling concrete, piping supports or structural steel beams. If cable sag at mid-span exceeds 12-inches, another support shall be provided. Cable supports shall be installed to maintain cable bend to larger than the minimum bend radius.
- I. Cabling shall not be attached to or supported by existing cabling, plumbing or steam piping, ductwork, suspended ceiling supports or electrical or communications conduit. Do not place cable directly on the ceiling grid or attach cable in any manner to the ceiling grid wires.
- J. All cables shall be free of tension at both ends. Nylon strain relief connectors shall be provided at each device and junction box where cables enter. In cases where the cable must bear some stress, Kellum type grips may be used to spread the strain over a longer length of cable.
- K. Cable manufacturer’s minimum bend radius shall be observed in all instances.
- L. Use suitable cable fittings and connectors.

3.5 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.6 LUMINAIRE CONNECTIONS

A. METAL-CLAD (MC) CABLE

Metal-Clad (MC) type cable that combines power and Class 2 circuits into a single cable may be used for the luminaire wiring where 0-10V dimming control wiring is required. Examples of such products are Encore Wire® MC-LED™ or Southwire® MC-PCS Duo™. Manufacturer's names and catalog numbers are used for quality and performance only. MC Cables manufactured by others shall be equally acceptable provided they meet or exceed in performance and quality as specified.

B. Recessed, including Master-Satellite connections:

1. Use a luminaire fixture whip from a J-box for recessed lay-in luminaires. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
2. Cable/Conduit whips shall be 3/8" (10 mm) minimum diameter, six feet (1.8 m) maximum length.
3. Flexible whips or pre-wired systems between master and satellite luminaires may be supported by the ceiling grid wires.
4. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.

C. Chain or Cable Hung (unfinished spaces):

1. Use manufacturer's SO cord or a luminaire fixture whip from a J-box. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
2. Conduit whips shall be 3/8" (10 mm) minimum diameter. Conduit whip or SO cord shall be cut to length (six feet (1.8 m) maximum) and shall allow movement of the chain/cable/luminaire, but shall not be long enough to "loop" and shall present a neat and workmanlike appearance.
3. Luminaire field wired flexible cord installations shall be connected per NEC 410.62.
4. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.
5. Conduit whip slack shall be tie-wrapped to the chain supports. Tie-wraps shall be UL listed for UV resistance.

D. Cable Hung (finished spaces):

1. Use manufacturer's SO cord from luminaire to a J-box.
2. SO cord shall be cut to length (six feet (1.8 m) maximum) and shall allow movement of the cable/luminaire, but shall not be long enough to "loop" and shall present a neat and workmanlike appearance.

3. SO cord slack may be tie-wrapped to the cable supports. Tie-wraps shall be UL listed for UV resistance.
 4. Luminaire field wired flexible cord installations shall be connected per NEC 410.62.
- E. Surface Mounted (unfinished spaces):
1. Provide direct conduit and box connection.
- F. Surface Mounted (finished spaces):
1. Provide direct conduit and box connection. Use surface metal raceway where indicated on drawings. Conceal box and conduit where appropriate. Flexible metal conduit shall not be used where the conduit is exposed.

END OF SECTION

EXTERIOR LIGHTING

PART ONE - GENERAL

1.1 SCOPE

- A. The work under this section includes exterior luminaires and accessories, poles, and foundations.

1.2 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.
- B. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

1.3 REFERENCE STANDARDS

- A. International Building Code IBC 1807.3 Embedded Posts and Poles
- B. LM-79-08 (or latest) – IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
- C. LM-80-08 (or latest) – IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- D. NEMA SSL 1-2010 (or latest) – Electronic Drivers for LED Devices, Arrays, or Systems.

1.4 DEFINITIONS

- A. Driver: The power supply used to power LED luminaires, modules, or arrays.
- B. L70, L₇₀, or L_{70%}: The reported life of an LED component or system to reach 70% lumen maintenance, or 70% of the LEDs original light output. This test is being developed by the IES and is currently described by TM-21-11.
- C. LEDs: Broadly defined as complete luminaire with light emitting diode (LED) packages, modules, light bars or arrays, complete with driver.
- D. LED luminaire failure: Negligible light output from more than 10 percent of the LEDs constitutes luminaire failure.

1.5 SUBMITTALS

- A. Shop Drawings: Indicate dimensions and components for each luminaire, pole and base.

- B. Product Data: For each luminaire type, submit luminaire information including catalog cuts with highlighted catalog numbers, and required accessories:
1. Luminaire:
 - a. Manufacturer and catalog number,
 - b. Type (identification) as indicated on the plans and schedule,
 - c. Delivered lumens,
 - d. Input watts,
 - e. Efficacy,
 - f. Color rendering index,
 - g. Performance data, and
 - h. Effective Projected Area (EPA).
 2. Driver:
 - a. Manufacturer and catalog number,
 - b. Type (Non-Dimming, Step-dimming, Continuous dimming, etc.),
 - c. Power Factor, Crest Factor, THD, etc.
 3. Pole (if applicable):
 - a. Diameter
 - b. Height
 - c. Pole thickness
 - d. Weight
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under "Regulatory Requirements".
- D. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Light Layout: Provide a computer-generated factory point-by-point foot-candle layout of the project for each area involved.
- F. Post Installation Report: Provide to the Engineer and DFD the results of the measured foot-candle level for each area involved. Use a measuring device pre-approved by DFD.

1.6 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of each luminaire, pole, and underground circuit.
- B. Provide record drawings of the final, as installed and measured, point-by-point foot-candle layout for each area involved.

1.7 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.8 COORDINATION

- A. Use bolt templates and pole mounting accessories to install anchor bolts in pole base.

PART TWO- PRODUCTS

2.1 LUMINAIRES

- A. See the Luminaire Schedule on the drawings for type of luminaires and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Luminaires manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated luminaires, and meet the intent of the design.
- B. Luminaire shall be certified by a Nationally Recognized Testing Laboratory (UL, ETL, or IEC).
- C. Provide luminaires with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.

2.2 LED LUMINAIRES

- A. LED Luminaires shall meet all DesignLights Consortium® (DesignLights.org) Product Qualification Criteria. This does not require that the luminaire be listed on the DesignLights Consortium's® Qualified Products List, but they must meet the Product Qualification Criteria. The technical requirements that the luminaire shall meet for each Application Category are:
 - 1. Minimum Light Output.
 - 2. Zonal Lumen Requirements.
 - 3. Minimum Luminaire Efficacy.
 - 4. Minimum CRI.
 - 5. L70 Lumen Maintenance.
 - 6. Minimum Luminaire Warranty of 5 years (not pro-rated) to include LED driver and all LED components.

Additional requirements:

- 1. Color Temperature of 3000K-4100K for interior luminaires as listed in the Luminaire Schedule on the plans. The color temperature of exterior LED luminaires should not exceed 4100K (nominal).
- 2. Color Consistency: LED manufacturer shall use a maximum 3-step MacAdam Ellipse binning process to achieve consistent luminaire-to-luminaire color for interior luminaires. Exterior luminaires shall use a maximum 5-step MacAdam Ellipse binning process.
- 3. Glare Control: Exterior luminaires shall meet DesignLights Consortium's® criteria for Zonal Lumen Distribution requirements or Backlight-Uplight-Glare (BUG) standards for exterior luminaires.
- 4. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
- 5. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
- 6. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
- 7. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
- 8. Lumen output shall not depreciate more than 20% after 10,000 hours of use.
- 9. Luminaire and driver shall be furnished from a single manufacturer to ensure compatibility.

10. Luminaire Color Rendering Index (CRI) shall be a minimum of 80 for interior luminaires, and a minimum of 70 for exterior luminaires.
11. LED luminaire shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the luminaire is to be installed. Rated case temperature shall be suitable for operation in the ambient temperatures typically found for the intended installation. Exterior luminaires to operate in ambient temperatures of -20°F to 122°F (-29°C to 50°C).
12. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent.
13. Luminaire shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.
14. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
15. All luminaires shall be provided with knockouts for conduit connections.
16. The LED luminaire shall carry a limited 5-year warranty minimum for LED light engine(s)/board array, and driver(s).
17. Provide all of the following data on submittals:
 - a. Delivered lumens
 - b. Input watts
 - c. Efficacy
 - d. Color rendering index.

2.3 LED DRIVERS

A. General:

1. Provide driver type (non-dimmed, step-dimmed, continuous-dimming, etc.) as indicated on the luminaire schedule on the drawings.
2. Minimum Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
3. Driver shall have a rated life of 50,000 hours, minimum.
4. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
5. Driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full input power and across specified voltage range.
6. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
7. Driver shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.
8. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
9. Provide all of the following data on submittals:
 - a. Input watts
 - b. Power Factor (pf)
 - c. Crest Factor (cf) at full input power
 - d. Total Harmonic Distortion (THD).

2.4 WIRING CONNECTORS

- A. Wiring Connectors shall meet the requirements of Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- B. Twist-On Wire Connectors: Solderless twist-on spring connectors (wire-nuts) with insulating covers for copper wire splices and taps. All wire connectors used in site lighting applications shall be silicone gel-filled twist connectors or connectors designed for damp and wet locations. Gel-filled twist-on connectors may be used for copper conductor sizes 6 AWG and smaller for site lighting applications. The manufacturer's wire fill capacity must be followed.

2.5 POLES

- A. Furnish products as specified in schedule on Drawings.
- B. Handhole: With removable weatherproof cover.
- C. Anchor Bolts: As recommended by pole manufacturer. Provide template, flat washers, lock washers, and hex nuts for each pole.

2.6 FOUNDATIONS

- A. Provide foundations for poles, bollards, and ground-mounted flood and accent lighting. Construct from reinforced concrete in sizes as shown on drawings and to meet the minimum structural requirements of SPS 362.1807 Shallow Post Foundations, and IBC 1807.3 Embedded Posts and Poles.
- B. Place the anchor bolts in pole bases so that the luminaire will be oriented perpendicular to the curb/street/sidewalk/parking lot or as indicated on the plan.
- C. Provide a concrete-encased electrode (UFER) grounding system for grounding the foundation, luminaire, and pole:
 - 1. Provide twenty-five (25) feet of #4 bare stranded copper grounding electrode conductor.
 - 2. Extend three (3) feet of the grounding electrode conductor out the top of the foundation for connection to the luminaire/pole.
 - 3. Clamp the grounding electrode conductor to the top of the rebar cage. Use a clamp rated for such use such as an Erico EK16 or similar.
 - 4. Spiral a minimum of ten (10) feet of the grounding electrode conductor around the outside of the rebar cage.
 - 5. Loop the remaining conductor around the rebar cage at the bottom of the foundation in direct contact with earth.
- D. The exposed surface area of the foundation shall have the forms removed and the concrete rubbed out to a smooth finish.

E. Pole Base J-Boxes:

1. For pole bases with multiple conduits to other poles/locations, the contractor may provide a non-metallic j-box with a curved cover mounted in the side of the exposed part of the base to accommodate the multiple conduits. Boxes shall be NEMA 3R Carlon Nonmetallic Curved Lid J-Boxes or equal. Mount j-box centered at 20" above grade. Use only in poles 18" in diameter and larger. Locate boxes 90-degrees or 180-degrees from traffic. Install boxes per manufacturer's recommendations.

PART THREE - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturers' instructions.
- B. Minimum underground conduit size is 1 inch.
- C. Underground and exterior wire shall be type XHHW-2 or USE-2.
- D. Project anchor bolts 2 inches (50 mm) minimum above base.
- E. Install all anchor bolts and handhole fasteners with anti-seize compound.
- F. Install poles plumb. Provide shims or double nuts to adjust plumb.
- G. Use belt slings or non-chafing ropes to raise and set pre-finished luminaire poles.
- H. Bond each luminaire, each metal accessory, the ground rod and the pole to the branch circuit equipment ground conductor with a separate ground wire sized per NEC or as shown on the drawings.
- I. Luminaire circuits shall have separate neutrals.

3.2 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.3 ADJUSTING

- A. Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.
- B. All new luminaires shall be operational at the Substantial Completion of the project.

3.4 CLEANING

- A. Clean photometric control surfaces.
- B. Clean finishes and touch up damage.

END OF SECTION

COMMON WORK RESULTS
FOR COMMUNICATIONS

PART ONE - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division One specification sections, apply to work of this section.
- B. Division 26 - Common Work Results for Electrical sections apply to work specified in this section.

1.02 DESCRIPTION OF WORK

- A. Extent of telephone/computer systems conduit system work is indicated by drawings and schedules, and is hereby defined to include conduit from each outlet to above an accessible corridor ceiling space and interior outlet boxes. Sleeves from each termination board or patch panel room to above an accessible corridor ceiling shall be provided for cable entry.
- B. The work of this section includes electrical raceways, boxes and fittings as specified in applicable Division 26 Common Work Results for Electrical Sections.
- C. Extent of service system work is indicated by drawings and schedules, and is hereby defined to include one - 4" minimum service conduits from the exterior to the interior terminal board as shown.

PART TWO - PRODUCTS

2.01 MATERIALS

- A. Refer to applicable Division 26 sections for telephone/computer system conduit.

PART THREE - EXECUTION

3.01 INSTALLATION OF TELEPHONE/COMPUTER SYSTEMS CONDUIT

- A. Coordinate with other electrical work, including raceways, electrical boxes and fittings, as necessary to interface installation of this work with other work.
- B. All conduit shall be left sealed against moisture collection, and a number sixteen (#16) gauge galvanized pull wire left between each box or outlet for the installer. Provide a minimum of 1" EMT to all systems boxes to include, but no limited to: telecom, data, voice, video, audio, security, surveillance and fiber. (Fire alarm and intercom shall be 3/4" EMT minimum.)

- C. Provide suitable pullwire in each conduit and an insulated bushing on each conduit termination.
- D. Cable to be bundled with plastic ties and secured to building structure. Do not lay on ceiling grid.
- E. Backboxes for telephone/computer outlets shall be mounted at 18 inches above finished floor unless noted otherwise.
- F. All above counter outlets shall be mounted accessible. Exact locations and mounting configuration shall be coordinated with Architect and Architectural millwork elevations.
- G. All work shall be in accordance with the Serving Utility requirements.
- H. All premise cabling shall be punched down at rack-mounted patch panels. Direct connections to switches not allowed.

END OF SECTION

STRUCTURED CABLING

PART ONE – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division 26 - Basic Materials and Methods shall apply to work specified in this section.
- C. Division 27 - Section 27 05 00 - Common Work Results for Communications shall apply to work specified in this section.

1.2 DESCRIPTION OF WORK

- A. This work includes the installation of:
 - 1. Computer structured building cabling, Category 6.
 - 2. Telephone and computer modular outlets: Where shown on the plans provide combination types and configurations as detailed.
 - 3. Structured building cabling, Category 6 for any other uses.

1.3 SUBMITTALS

- A. General:
 - 1. Material and documentation shall be submitted for review and approval as follows:
 - a. Installation and operation instructions
 - b. Manufacturer's descriptive literature
 - c. Applicable riser diagrams
 - d. Floor plans as described below
 - 2. Incomplete or partial submittals will not be reviewed nor approved until all requested items are provided to the Engineer. Completeness of the submittal is the sole responsibility of the Contractor.
 - 3. Sufficient information, clearly marked, shall be presented in order for the reviewer to determine compliance with contract documents. Unmarked submittals shall be returned un-reviewed.
 - 4. A complete submittal shall contain:
 - a. Product Descriptions,
 - b. Floor Plans and Comm. Closet layouts,
 - c. O & M Manual (excluding project test reports)
- B. Product Descriptions:
 - 1. Provide manufacturer's standard catalog sheets for the voice/data system devices proposed. This shall include (but not limited to) cabling (copper and fiber optic), modular jacks, device plates, sample labels, and sample test report.
 - 2. Each item proposed shall be clearly marked with complete part numbers.

C. Floor Plans:

1. Provide large scale drawings (24" x 36" or 32" x 42"). Drawings shall be produced with a "CAD" program. Photocopied floor plans from the contract document set are unacceptable. 8½" x 11" drawings are also unacceptable. CAD file background drawings are available from the Architect/Engineer; refer to Section 26 05 00 – Basic Electrical Requirements.
2. Floor plans shall show as a minimum: 1/8 scale walls, rooms with names and numbers, voice/data outlet locations, symbol legend, wire and cable types and counts.
3. Provide large scale (e.g. ¼" = 1'-0") of communication closet layouts showing all equipment locations and dimensioned from walls.
4. Provide a site plan showing exterior building connections where applicable.

D. O & M Manuals:

1. Manuals shall be bound into "book" form and marked "O & M VOICE/DATA System Manual".
2. Manuals shall contain system operating information along with component technical sheets.
3. Manuals shall contain system component interconnection wiring diagrams marked as applicable for this project. General wiring diagrams are unacceptable.
4. Manuals shall provide clear and concise information on such items (but not limited to):
 - a. Product data sheets
 - b. Basic Troubleshooting
 - c. Cabling test reports
 - d. Contact Information for Warranty, Repair, Maintenance work

1.4 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of premise cabling products of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with voice and data cabling work similar to that required for this project. Installers shall have proof of factory certification for products specified for this project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of products and work specified herein.

1.5 ACCEPTABLE MANUFACTURERS

- A. Companies who have formed alliances and have engaged in manufacture of Category 6 cabling products of types and ratings as specified herein and whose products have been in satisfactory use in similar service for not less than 3 years.
 1. Group 1: Berk-Tek under the trade name *LANmark*.
 2. Group 2: Commscope Products under the trade name *NETCONNECT*.
 3. Group 3: Siemon under the trade name *SYSTEM 6*.

PART TWO – PRODUCTS

2.1 CABLING

- A. Computer building wiring shall be 4 pair Category 6 UTP #23 AWG plenum 550MHZ rated, NEC type CMP. Outer jacket shall be blue in color. Accepted Category 6 manufacturer shall be as listed in Section 1.05.

2.2 MODULAR JACKS

- A. Provide data modular jacks style RJ-45, 8P8C, 568B wired, with 110 style punch down terminations for computer use. Color selection by Owner. Accepted Category 6 manufacturer shall be as listed in Section 1.05.
- B. Provide thermoplastic faceplates with two, three, or four modular ports and configuration of modular jacks as specified on the plans. Where required provide blank closures. Color to match other wiring device faceplates.

PART THREE – EXECUTION

3.1 GENERAL

- A. All system components and appurtenances shall be installed in accordance with the manufacturer's instructions as specified and indicated. All installation work must be done in accordance with the safety requirements set forth in the general requirements of ANSI C2 and NFPA 70.
- B. Interior cabling shall be installed and terminated at all station locations as indicated on the Drawings and herein specified. Cabling shall take the form of a "Structural Building Wiring Plan" where station cables are wired directly from a distribution point to the appropriate outlet location. Station cables shall not be installed in the same raceway with AC power cables. Station cables not installed in raceways shall be properly secured above the ceiling on system cable supports as shown on the Drawings. Cables shall not be installed on top of the tiles of lay-in ceiling grid system.
- C. Labeling and marking shall be as follows:
 - 1. Provide permanent markers on each cable at each termination point for easy identification. Numbering for jack identification shall be as described below unless the Owner has a predetermined identification scheme.
 - 2. Jack numbering shall match the corresponding patch panel in the communications closet. Labels are to be machine made; hand written labels are unacceptable.
 - 3. Data jacks shall be numbered with the flowing scheme: nn-01-D01, where nn is the building number, 01 is the floor number, "D" indicates data, and 01 is the 1st cable in the sequence for that floor.
- D. All cables shall be terminated in approved modular jacks or termination enclosures. No cables shall be left "free" unless so stated on the Drawings.

3.2 INSTALLATION OF STRUCTURED COMPUTER CABLING

- A. The computer wiring standard shall be T568B.
- B. The Contractor shall install the computer system connecting all outlets and cabling to patch panels for a complete premise wiring system. This system shall be tested as specified herein.

3.3 TESTING - GENERAL

- A. After installation the Contractor shall test the structured cabling systems as outlined below. Tests performed will have the results recorded in a three ring binder form and submitted to the Architect; provide three copies for review. Test reports shall be attached a signed affidavit by the contractor certifying the reports. Outlets/cables failing these test procedures shall be corrected (or replaced) and retested at no additional cost to the Owner. After testing all cables will have a PASS rating.
- B. The Contractor shall provide the necessary testing equipment for testing all cabling under this project. Installers testing cabling shall have a minimum of three years experience in industry testing procedures; installers shall also have factory certification in testing. Copies of this certification shall be available to Owner for examination upon request. Copies of all test reports shall be included with close-out documents.
- C. The Owner reserves the right to witness any or all testing. The Contractor shall advise the Owner in written when testing is scheduled at least one week in advance of actual testing.

3.4 TESTING - STRUCTURED COMPUTER CABLING

- A. Each computer cable shall be tested from each outlet (jack) to the patch panel for the following parameters:
 - 1. Basic data:
 - a. Cable manufacturer and part number, NVP
 - b. ester manufacturer, model, serial number and hardware/software versions.
 - c. Project name and circuit ID number
 - d. Autotest specification used
 - e. Overall PASS/FAIL indication
 - f. Date of test
 - 2. Wire Map:
 - a. Continuity
 - b. Shorts between conductors
 - c. Crossed pairs
 - d. Reversed pairs
 - e. Split/open pairs
 - 3. TIA/EIA 568-B.2 testing criteria for Permanent Link shall be followed as described below and shall meet the minimum values specified in the table below.
 - a. Cable length in meters
 - b. Propagation delay
 - c. Delay skew
 - d. Attenuation
 - e. Near End Cross Talk (NEXT); both ends
 - f. Power sum NEXT (PS NEXT); both ends

- g. ELFEXT; both ends
- h. Power Sum ELFEXT (PS ELFEXT); both ends
- i. Return Loss; both ends
- j. ACR
- k. Power Sum ACR

Permanent Link Performance –based upon TIA/EIA 568-B.2 (Draft 9b)								
Frequen cy MHz	Attenuati on, db	Return Loss, db	NEXT, db	PS NEXT, db	ELFEXT, db	PS ELFEXT, db	ACR, db	PS ACR, db
1.0	1.9	19.1	65.0	62.0	64.2	61.2	62.0	59.0
4.0	3.5	21.0	64.1	61.8	52.1	49.1	60.6	58.3
8.0	5.0	21.0	59.4	57.0	46.1	43.1	54.4	52.1
10	5.6	21.0	57.8	55.5	44.2	41.2	52.3	49.9
16	7.0	20.0	54.6	52.2	40.1	37.1	47.6	45.2
20	7.9	19.5	53.1	50.7	38.2	35.2	45.2	42.8
25	8.9	19.0	51.5	49.1	36.2	33.2	42.6	40.2
31.25	10.0	18.5	50.0	47.5	34.3	31.3	40.0	37.6
62.5	14.4	16.0	45.1	42.7	28.3	25.3	30.8	28.3
100	18.6	14.0	41.8	39.3	24.2	21.2	23.3	20.7
200	27.4	11.0	36.9	34.3	18.2	15.2	9.6	7.0
250	31.1	10.0	35.3	32.7	16.2	13.2	4.2	1.6
Propagation Delay: 498 ns					Delay Skew: 44 ns			

- B. UTP testers shall be approved for Level III as a field test device. Testers shall be factory calibrated by the manufacturer. The contractor shall provide a copy of the calibration certificate upon request by the Engineer or Owner.

3.5 WARRANTY

- A. The Contractor shall warrant his installation against product defects and workmanship. All cabling components shall meet or exceed the requirements of TIA/EIA-568B, for a minimum period of 10 years.

END OF SECTION

EXCAVATION AND FILL

PART ONE - GENERAL

1.1 WORK INCLUDED

- A. Excavate for the following structures and stockpile subsoil on site or, if suitable, use fill material on the site.
 - 1. Footings, for building and other structures.
 - 2. Sidewalks and steps.
- B. Shore and brace excavations as required.
- C. Place and compact fills to rough grade elevations.
- D. Dewater excavations.

1.2 RELATED WORK

- A. Concrete Division Three

1.3 SUBMITTALS

- A. Submit minimum 10 pounds samples of each type of excavated backfill material to be used. Forward samples to appointed testing laboratory, packed tightly in containers to prevent contamination.
 - 1. Protect trees, shrubs, and lawns, areas to receive planting, rock outcropping, and other features remaining as part of final landscaping.
 - 2. Protect bench marks and existing structures, roads, sidewalks, paving, and curbs against damage from equipment and vehicular or foot traffic.
 - 3. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods, as required to prevent cave-ins or loose dirt from falling into excavations.
 - 4. Underpin adjacent structures, which may be damaged by excavation work, including service lines and pipe chases.
 - 5. Notify Architect of unexpected sub-surface conditions and discontinue work in areas until Architect provides notification to resume work.
 - 6. Protect bottom of excavations and soil around and beneath foundations from frost or freezing.
 - 7. Grade around excavations to prevent surface water run-off into excavated areas.

PART TWO - PRODUCTS

2.1 SUITABLE BACKFILL MATERIALS

- A. Gravel: Angular crushed natural stone free from shale, clay, friable materials, and debris.
- B. Pea gravel: Clean natural stone free from clay, shale, and organic matter.

- C. Sand: Clean natural river or bank sand free from silt, clay, loam, friable or soluble materials, and organic matter.
- D. Under areas not to be paved: Sub-soil free from roots, rock larger than 3 inches in size, and building debris.
- E. Under structures or areas to be paved: Material meeting requirements for controlled fill as specified in Section 31 22 00, Article 2.1.
- F. Fill under landscaped areas: Free from alkali, salt, petroleum products. Use sub-soil excavated from site only if conforming to specified requirements in Paragraphs 4 or 5 above.

PART THREE - EXECUTION

3.1 PREPARATION AND LAYOUT

- A. Establish extent of excavation by area and elevation; designate and identify datum elevation.
- B. Set required lines and levels.
- C. Maintain bench marks, monuments and other reference points.

3.2 UTILITIES

- A. Before starting excavation, establish location and extent of underground utilities occurring in work area.
- B. Notify utility companies to remove and relocate lines which are in the way of excavation.
- C. Maintain, re-route, or extend as required existing utility lines to remain which pass through work area.
- D. Pay costs for this work except those covered by utility companies.
- E. Protect utility services uncovered by excavation.

3.3 EXCAVATION

- A. Excavate sub-soil in accordance with lines and levels required for construction of the work, including space for forms, bracing and shoring, foundation drainage system, and to permit inspection.
- B. Do additional excavation only by written authorization of Architect.
- C. Machine-slope banks.
- D. Hand trim excavations and leave free from loose or organic matter.
- E. Footings shall always be poured the same day that excavations are made, and water shall never be allowed to stand in excavated footing trench.
- F. When complete, verify soil bearing capacities, depths and dimensions.

- G. Correct unauthorized excavation as directed, at no cost to Owner.
- H. Fill over-excavated areas under structure bearing surfaces with concrete as specified for foundations.
- I. Excavations are not to interfere with normal 45 degree bearing splay of any foundation.
- J. Stockpile excavated sub-soil for reuse where directed. Remove excess or unsuitable excavated sub-soil from site.
- K. Do not disturb soil within branch spread of existing trees or shrubs that are to remain.

3.4 BACKFILLING

- A. Stockpile fill material in area(s) designated by Architect.
- B. Ensure areas to be backfilled are free from debris, snow, ice and water, and that ground surfaces are not in a frozen condition.
- C. Do not backfill over existing sub-grade surfaces which are porous, wet, or spongy.
- D. Compact existing sub-grade surfaces if densities are not equal to that required for backfill materials.
- E. Cut out soft areas of existing sub-grade. Backfill with sand and compact to required density.
- F. Backfill areas to grades, contours, levels and elevations.
- G. Backfill systematically and as early as possible to allow maximum time for natural settlement and compaction.
- H. Place and compact back fill materials in continuous layers not exceeding 6 inches loose depth.
- I. Maintain optimum moisture content of backfill materials to attain required compaction density.
- J. Where temporary unbalanced pressures are liable to develop on walls, erect necessary shoring to counteract imbalance. Leave in place until their removal is approved by Architect.

3.5 FILL TYPES AND COMPACTION

- A. Within building area: Restore controlled fill to underside of stabilizing base course for floor slabs to density requirements specified in Section 31 22 00, Article 3.3.
- B. Backfill under areas not to be paved: Compact with mechanical tampers until material is as firm and unyielding as the surrounding material undisturbed by excavation.
- C. Fill under landscaped areas: Sub-soil to within 12 inches of finish grade elevation.

END OF SECTION

CHAIN LINK FENCES AND GATES

PART ONE - GENERAL

1.1 DESCRIPTION

- A. Work included: All labor and material to complete all fencing, chain link and vinyl coated with privacy slats, and related items, complete in place as shown on the drawings and herein specified or otherwise required for a complete installation.

1.2 QUALITY ASSURANCE

- A. Qualifications of manufacturers: Products used in the work of this Section shall be produced by Manufacturer's regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Qualifications of personnel: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Reference standards:
1. Chain Link Fence Manufacturers Institute
 2. ASTM A-392 Zinc-coated Steel Chain Link Fence Fabric
 3. ASTM A-120 Hot-Dipped Zinc-coated Welded and Seamless Steel Pipe for Ordinary Use

1.3 SUBMITTALS

- A. General: Comply with the provisions of Section 01 33 23.
- B. Product data: Within 30 calendar days after award of the Contract, submit:
1. Complete materials list of all items proposed to be furnished and installed under this Section.
 2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
 3. Shop drawings showing all proposed work of this section.
 4. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.4 GUARANTEE

- A. The Contractor and any Subcontractors hereunder guarantees their respective work against defective materials or workmanship for a period of one (1) year from date of filing notice of completion and an acceptance by the Owner. Provide vinyl coated fencing manufacturer's standard limited warranty that its' coated chain link fencing is free from color coating flaking and peeling and other defects in material or workmanship for a period of 15 years from the date of purchase.

PART TWO - PRODUCTS

2.1 CHAINLINK FABRIC

- A. Fabric shall be zinc-coated, after fabrication, No. 11 gauge and one and three-fourths inch (1-3/4") or two inch (2") mesh. Top selvage shall have a knuckle finish. 4'0" height typical unless noted otherwise on plans.
- B. All fabric shall be free of barbs, icicles, or other projections resulting from the galvanizing process, and any fabric not free thereof will be rejected even though erected.

2.2 POSTS

- A. All posts shall conform to hot dipped zinc-coated (galvanized) welded and seamless pipe for ordinary uses, ASTM A-120, SS20.
 - 1. All 6' or less line posts shall have outside diameter of not less than 1-7/8" with terminal and gate post diameter of not less than 2-3/8".
 - 2. All 8' or more line posts shall have outside diameter of not less than 2-7/8" with terminal and gate post diameter of not less than 4".

2.3 RAILS

- A. All top rails shall meet the same specifications of quality as posts and have an outside diameter of one and five-eighths inch (1-5/8") and weight 2.27 pounds per lineal foot. An outside sleeve-type coupling measuring not less than seven inches (7") in length shall be provided at each interval of twenty feet (20').

2.4 TERMINAL AND GATE POST FITTINGS

- A. Terminal and gate post fittings, including tension bands, and top rail connections, shall be No. 11 gauge, hot-dipped, galvanized, cold-rolled carbon steel. No aluminum, cast iron, or pot metal fittings will be accepted as equal or substitutes. Top rails shall not be less than one inch (1") wide, secured by three-eighths inch (3/8") diameter carriage bolts and nuts.

2.5 BOTTOM TENSION WIRE

- A. Bottom tension wires shall be No. 9 gauge galvanized steel coil tension wire, high carbon or hard drawn, ASTM Designation A-116, Class 11, galvanized, fastened to the chainlink fabric at intervals of twenty-four inches (24") with No. 11 gauge galvanized steel hog rings.

2.6 POST TOPS

- A. Tops of line posts shall be of a malleable casting or pressed steel. The base of tops shall extend below the top of the post not less than two inches (2"). Terminal post tops shall be of malleable iron or pressed steel, be one of the manufacturer's standard designs as selected or approved by the Architect and be designed so as positively to exclude all moisture from the terminal post.

2.7 GATES

Gates shall be size shown on the drawings. Frames shall be constructed of pipe conforming to Standard specifications for Hot-Dipped Zinc-Coated (galvanized) Welded and Seamless Steel Pipe for Ordinary Uses, ASTM Designation A-120, having an outside diameter of one and one-half inches (1-1/2") and weighing 1.9 pounds per lineal foot. Gate frames shall utilize corner fittings of heavy malleable iron or pressed steel securely riveted to the frame. Fabric matching the fence fabric shall be installed in the frame by means of tension bars and hook bolts. Frames having corner fittings shall be equipped with adjustable truss rods having a diameter of three-eighths inch (3/8"). Hinges shall be of adequate strength to support the gate and have large bearing surfaces for clamping in position. Under no conditions of use or abuse shall the hinges twist or turn under the action of the gate. Gates shall be capable of being opened and closed quickly and easily by one (1) person. Gates shall be equipped with a positive latching device that will accommodate padlocking. Hinges, latches, and catches shall be one of the manufacturer's standard designs as approved by the Architect.

2.8 VINYL COATED FENCING WITH PRIVACY SLATS

- A. Products from qualified manufacturers having a minimum of five years experience manufacturing thermally fused chain link fencing will be acceptable by the Architect as equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.
- B. Obtain chain link fencing, privacy slats and gates, including accessories, fittings, and fastenings, from a single source.
- C. Approved Manufacturer:

Master Halco, Inc.
4000 W. Metropolitan Drive, Suite 400
Orange, CA 92868
Phone (800) 229-5615
Fax (714) 385-0107
- D, Chain Link Fence Fabric
 - 1. Polyolefin elastomer coating, thermally fused to zinc-coated steel core wire: Per ASTM F668 Class 2b.
 - 2. Choose color from manufacturer's standard colors.

2.10 STEEL FENCE FRAMING

- A. Steel pipe - Type I: ASTM F 1083, standard weight schedule 40; minimum yield strength of 30,000 psi sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz/ft² of coated surface area.
- B. Polyolefin Coated finish: In accordance with ASTM F1043, apply supplemental color coating of minimum 10 mils of thermally fused polyolefin. Color to be selected from manufacturer's standard colors.

2.11 POLYOLEFIN COATED ACCESSORIES

- A. Chain link fence accessories: [ASTM F 626] Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing. Fittings should match Master Halco specifications.
- B. Post caps: Formed steel, cast malleable iron, or weather tight closure cap for tubular posts. Provide one cap for each post. Cap to have provision for barbed wire when necessary. "C" shaped line post without top rail or barbed wire supporting arms do not require post caps. (Where top rail is used, provide tops to permit passage of top rail.)
- C. Top rail and rail ends: Pressed steel per ASTM F626, for connection of rail and brace to terminal posts.
- D. Top rail sleeves: 7" expansion sleeve with a minimum .137" wire diameter and 1.80" length spring, allowing for expansion and contraction of top rail.
- E. Wire ties: 9 gauge galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 12-1/2 gauge for attachment of fabric to tension wire.
- F. Brace and tension (stretcher bar) bands: Pressed steel, minimum 300 degree profile curvature for secure fence post attachment. At square post provide tension bar clips.
- G. Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4". Provide tension (stretcher) bars where chain link fabric meets terminal posts.
- H. Tension wire: Thermally fused polyolefin applied to zinc coated steel wire: Per ASTM F 1664 Class 2 b, 6 gauge, diameter core wire with tensile strength of 75,000 psi.

2.12 SETTING MATERIALS

- A. Concrete: Minimum 28 day compressive strength of 3,000 psi.

OR
- B. Drive Anchors: Galvanized angles, ASTM A 36 steel 1" x 1" x 30" galvanized shoe clamps to secure angles to posts.

PART THREE - EXECUTION

3.1 INSPECTION

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

3.2 INSTALLATION

A. Chainlink fence:

1. Post spacing shall be uniform and not over 10 feet on centers. Posts shall be carefully aligned and plumb in each direction. Set in concrete pads as shown on the Drawings.
2. The top rail shall be continuous through line posts and rigidly connected to all end and corner posts.
3. Chainlink fabric shall be placed with top flush with top of rail and bottom one inch above finished grade at backstop and 3/4" above pad surface. Stretch fabric tightly to eliminate sags and buckles. Lace to posts at intervals, not exceeding 14 inches to top rail, and intermediate rails at 24 inch intervals, with No. 6 galvanizing wire or equivalent. Turn back lacing to eliminate exposed ends.
4. Installation shall meet the recommendations of the Chain Link Fence Manufacturers Institute.

END OF SECTION

SEEDING

PART ONE - GENERAL

1.1 WORK INCLUDED

- A. Preparation of sub-grade
- B. Placing topsoil
- C. Seeding 10' around areas disturbed by construction
- D. Fertilizing and watering
- E. Compacting disturbed gray gravel area that is not seeded

1.2 RELATED WORK

- A. Grading Section 31 22 00

1.3 SUBMITTALS

Submit certification that the seed meets the specifications requirements, and that it complies with the requirements of the Arkansas State Plant Board.

PART TWO - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Use topsoil excavated from the site only if conforming to the specified requirements:
 - 1. Existing topsoil: Natural, fertile, agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than 6% organic matter, and corrected to pH value of 5.9 to 7.0. Free from subsoil, slag, clay stones, lumps, live plants, roots, sticks, crabgrass, cough grass, noxious weeds, and foreign matter.
 - 2. Imported topsoil: Natural, fertile, agricultural soil typical of locality, capable of sustaining vigorous plant growth, from well drained site free of flooding, not in frozen or muddy condition, not less than 6% organic matter, and lumps, live plants, roots, sticks, crabgrass, cough grass, noxious weeds and foreign matter.
- B. Fertilizer: FS 0-F-241, commercial type.
 - 1. Proportions: 10N-20P-10K, unless soil test analysis indicated different proportions are required.
- C. Seed: Common hulled bermuda.

PART THREE - EXECUTION

3.1 PREPARATION OF SUB-GRADE

- A. Fine grade sub-grade, eliminating uneven areas and low spots. Maintain lines, levels, profiles, spot elevations, and contours shown on the drawings. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, undesirable plants and their roots, stones, and debris subject to termite attack, rot or corrosion. Do not bury foreign material beneath areas to be seeded or sodded. Remove sub-soil which has been contaminated with petroleum products.
- C. Cultivate sub-soil to a depth of 3" where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil. Depressions where water will stand or inequalities in the grade shall be corrected before topsoil is spread.

3.2 PLACING TOPSOIL

- A. Furnish, place, and spread topsoil to a minimum depth of three inches over entire areas to be sodded or seeded.
- B. Place topsoil during dry weather and on dry unfrozen sub-grade.
- C. Grade to eliminate rough and low areas, ensuring positive drainage. Maintain levels, profiles, spot elevations, and contours of sub-grade. For seeding areas, rake until surface is smooth. Provide positive surface drainage away from the building walls in all directions.
- D. Remove stones, roots, grass, weeds, debris and other foreign non-organic material while spreading.

3.3 FERTILIZING SEEDED AREAS

- A. After fine grading apply fertilizer at a rate recommended by the manufacturer.
- B. Mix thoroughly into upper two inches of topsoil.
- C. Lightly water to aid breakdown of fertilizer and to provide moist soil for seed.
- D. Apply fertilizer within 48 hours before seeding.

3.4 SEEDING

- A. Apply seed at rate of one to two pounds per 1000 square feet.
- B. Roll seeded area with rollers not exceeding 112 pounds.
- C. Apply water with fine spray immediately after sowing.

- D. Water shall be applied on all seeded areas in quantities and at intervals to provide optimum growing conditions for the establishment of a healthy, uniform stand and cover of grass. Maintain seeded areas until end of project.

END OF SECTION