PROJECT MANUAL
INCLUDING SPECIFICATIONS
FOR CONSTRUCTION

PUBLIC WORKS ADDITIONS
City of Paragould
Paragould, Arkansas

ARCHITECT PROJECT NO. 23044
DATE: August 16, 2024

LEWIS ARCHITECTS ENGINEERS
ELLIOTT • MCMORRAN • VADEN
RAGSDALE • WOODWARD • INCORPORATED
501.223.9302 • FAX 501.223.9909 • WWW.LEMVRW.COM

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

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NOTICE TO BIDDERS

PUBLIC WORKS ADDITIONS
CITY OF PARAGOULD
PARAGOULD, ARKANSAS

Sealed proposals will be received on General Contract for PUBLIC WORKS ADDITIONS, CITY OF PARAGOULD, PARAGOULD, ARKANSAS. The Owner will receive sealed proposals until 2:00 p.m., September 10, 2024, at the office of the Mayor, 301 W. Court St., Paragould, 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

Office of the Mayor
301 W. Court St.
Paragould, AR 72450

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 $300 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 $100 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 cashiers check in the amount of five percent (5%) of the bid, made payable to the City of Paragould, Paragould, 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.

City of Paragould
Mayors Office
301 W. Court St.
Paragould, AR 72450

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

BID FORM

PUBLIC WORKS ADDITIONS
CITY OF PARAGOULD
PARAGOULD, ARKANSAS

Proposal of_____

License No._____of_____
City State

Date_____

To the:
City of Paragould
Paragould, Arkansas

1. Pursuant to and in compliance with the invitation to bid and the Proposed Contract Documents relating to construction of:

PUBLIC WORKS ADDITIONS
CITY OF PARAGOULD
PARAGOULD, ARKANSAS

Including
addenda_____

The undersigned, having become thoroughly familiar with the terms and conditions of the Proposed Contract Documents and with local conditions affecting the performance and cost of the Work at the place where the Work is to be completed, and having fully inspected the site in all particulars, hereby proposes and agrees to fully perform the Work within the time stated and in strict accordance with the proposed Contract Documents, including furnishing any and all labor, and materials, and to do all of the work required to construct and complete said work in accordance with the Contract Documents, for the following sum of money:

A. BASE BID: All labor, materials, services, and equipment necessary for completion of the Work as shown on the Drawings and in the Specifications.

_____dollars ($_____)

B. DEDUCTIVE ALTERNATE NO. 1: State the amount to be deducted from the Base Bid to omit work at existing building A (interior and exterior) as well as the two heavy duty drives on south side of existing Building A. MTL-2 at Building B shall be MTL-1 (use PBR panel in lieu of concealed fastener vertical panels).

_____dollars ($_____)

C. DEDUCTIVE ALTERNATE NO. 2: State the amount to be deducted from the Base Bid to omit Building C in its entirety and the 8" slabs of Building C. Grading shall remain as shown on the Civil drawings.

_____dollars ($_____)

D. DEDUCTIVE ALTERNATE NO. 3: State the amount to be deducted from the Base Bid to omit Building D in its entirety, its 8" slab and the 10" perimeter concrete. Grading shall remain as shown on the Civil drawings.

_____dollars ($_____)

E. DEDUCTIVE ALTERNATE NO. 4: State the amount to be deducted from the Base Bid to use epoxy paint in lieu of FRP at Building B. Use MTL-1 in lieu of MTL-2 at Building A and B.

_____dollars ($_____)

F. TRENCHING SAFETY SYSTEMS: Ark. Code Ann. §22-9-212 requires the Contractor to indicate on this bid form the cost of Trenching Safety Systems. (Note: This cost shall be included in the above Base Bid.)

_____dollars ($_____)

2. Undersigned hereby agrees to use the following subcontractors subject to the approval of the Owner and Architect.

	SUBCONTRACTOR	LICENSE NO.
Plumbing:		
HVAC:		
Electrical:		
Painting:		
Metal Roof Installer:		

MATERIAL SUPPLIER (NAME ONLY)

Metal Building Manufacturer:
_____

3. I understand that the Owner reserves the right to reject this bid, but that this bid shall remain open and not be withdrawn for a period of thirty (30) days from the date prescribed for its opening.

4. If written notice of the acceptance of this bid is mailed or delivered to the undersigned within thirty (30) days after the date set for the opening of this bid, or at any time thereafter before it is withdrawn, the undersigned will execute and deliver the Contract Documents to the Owner in accordance with this bid as accepted, and will also furnish and deliver to the Owner the Performance Bond, Labor, and Material Payment Bond and proof of insurance coverage, all within ten days after personal delivery or after deposit in the mails of the notification of acceptance of this bid.

5. Accompanying this proposal is a bid bond or cashiers check in the amount of _____dollars ($_____) which will become the property of City of Paragould as liquidated damages if the undersigned fails to perform the requirements of Paragraph 4.

6. The undersigned hereby agrees to complete the work within_____calendar days after issuance of Notice To Proceed, and that the Owner may retain the sum of one thousand dollars ($1,000) from the amount of compensation to be paid the undersigned for each calendar day after the above mentioned time that the work remains incomplete. The amount is agreed upon as the proper measure of liquidated damages which the Owner will sustain per day by the stipulated time and is not construed in any sense as a penalty.

7. The undersigned respectfully submits this bid:

Sign here:

_____

_____
Signature of Bidder

NOTE: If bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If bidder is a partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

Business Address: _____

_____

Telephone Number: _____

Email Address: _____

Fax Number: _____

Date of Proposal: _____

END OF BID FORM

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

COVERAGES **CERTIFICATE NUMBER:** 2023 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	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:	Y	Y	Policy Number	12/10/2023	12/10/2024	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG [ ]	$ 1,000,000 $ 100,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [X] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY			Policy Number	12/10/2023	12/10/2024	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) [ ]	$ 1,000,000 $ $ $ $
C	[X] UMBRELLA LIAB [X] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000	Y	Y	Policy Number	12/10/2023	12/10/2024	EACH OCCURRENCE AGGREGATE [ ]	$ 1,000,000 $ 1,000,000 $
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [Y] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	Policy Number	12/10/2023	12/10/2024	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
E	Builders Risk Property Insurance			Policy Number	12/10/2023	12/10/2024		

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

Project Name

CERTIFICATE HOLDER

SAMPLE CERTIFICATE

CANCELLATION

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: _____

LOC #: _____

ADDITIONAL REMARKS SCHEDULE

AGENCY	NAMED INSURED
ABC Insurance Agency	ABC Construction Company
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_____2024 and was completed on or before the _____day of _____2024, 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_____, 2024.

_____
Notary Public

My commission expires:
_____ Seal

"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 $l,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.

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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

MONTH	AVERAGE NO. OF DAYS .01" OR MORE
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

GEOTECHNICAL ENGINEERING REPORT

Proposed Paragould Public Works
600 Airport Road
Paragould, Arkansas
PSI Project No. 0514583

PREPARED FOR:

Lewis Architects Engineers
C/o Mr. Ryne Pruitt, AIA LEED GA
11225 Huron Lane, Suite 104
Little Rock, AR 72211

July 25, 2024

BY:

PROFESSIONAL SERVICE INDUSTRIES, INC.
404 Manson Road, Suite 130
Sherwood, Arkansas 72120
Phone: (501) 939–4620

Professional Service Industries, Inc.
404 Manson Road, Suite 130
Sherwood, Arkansas 72120
Office – (501) 939-4620

July 25, 2024

Lewis Architects Engineers
c/o Mr. Ryne Pruitt, AIA LEED GA
11225 Huron Lane, Suite 104
Little Rock, AR 72211

Attn: Mr. Ryne Pruitt

RE: GEOTECHNICAL ENGINEERING REPORT
PROPOSED PARAGOULD PUBLIC WORKS
600 AIRPORT ROAD
PARAGOULD, ARKANSAS
PSI Project No. 0514583

Dear Mr. Pruitt:

Professional Service Industries, Inc. (PSI), an Intertek company, is pleased to submit this Geotechnical Engineering Report for the referenced project. This report includes the results from the field and laboratory investigation along with recommendations for use in preparation of the appropriate design and construction documents for this project.

PSI appreciates the opportunity to provide this Geotechnical Engineering Report and looks forward to continuing participation during the design and construction phases of this project. PSI also has great interest in providing materials testing and inspection services during the construction of this project and will be glad to meet with you to further discuss how we can be of assistance as the project advances.

If there are questions pertaining to this report, or if PSI may be of further service, please contact us at your convenience.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Rajashekar Valusa, E.I.T.
Staff Engineer

Matthew Satterfield, P.E.
Vice President / Principal Consultant

STATE OF ARKANSAS
7-25-24
LICENSED PROFESSIONAL ENGINEER
No. 15476
MATTHEW RYAN SATTERFIELD

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1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

Professional Service Industries, Inc. (PSI), an Intertek company, has completed a field exploration and geotechnical evaluation for the proposed Paragould Public Works to be constructed in Paragould, Arkansas. This investigation was accomplished in general accordance with PSI Proposal No. 0514-428680, dated June 21st, 2024. Our services were authorized by Mr. Ryne Pruitt, AIA LEED Green Associate with Lewis Architects Engineers by signing our Proposal on March 15, 2023.

1.2 PROJECT DESCRIPTION

Based on information provided by Mr. Ryne Pruitt with Lewis Architects Engineers, PSI's review of provided information from the emails dated June 20th, 2024, a summary of our understanding of the proposed project is provided in Table 1.1.

TABLE 1.1: GENERAL PROJECT DESCRIPTION

Project Items	The proposed project consists of design and construction of a three (3) new one-story buildings, parking lot along with paving and driveway areas. It is understood that the proposed structure will be of steel structure and metal stud walls with brick veneer. 1. The approximate areas of three buildings B, C & D are 3,500 Square feet, 11,200 Square feet and 9,600 Square feet.
Building Construction Types	Building and Paving.
Finished Floor Elevation	Not known at this time.
Requested Foundation Type	Shallow foundations: footings, slab-on-grade; PSI to recommend based on site conditions.
Maximum Design Loading	Not known at this time.
Pavement for Parking and Drives	Flexible and Rigid Pavement.
Anticipated Traffic	Not known at this time.

Detailed structural loading and site grading plan was not provided at the time of this report was prepared.

The geotechnical recommendations presented in this report are based on the available project information, structure locations, and the subsurface materials encountered during the field investigation. If the noted information or assumptions are incorrect, please inform PSI so that the recommendations presented in this report can be amended as necessary. PSI will not be responsible for the implementation of provided recommendations if not notified of changes in the project.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this study is to evaluate the subsurface conditions at the site and develop geotechnical engineering recommendations and guidelines for use in preparing the design and other related construction documents for the proposed project. The scope of services included drilling soil borings, performing laboratory testing, and preparing this geotechnical engineering report.

This report briefly outlines the available project information, describes the site and subsurface conditions, and presents the recommendations regarding the following:

- Description of subsurface conditions and groundwater information;
- Boring logs with laboratory test results;
- Seismic Site Classification;
- Site preparation recommendations;
- Foundation design recommendations;
- Pavement recommendations; and
- Discussions of factors which may impact construction and performance of the proposed construction.

The scope of services for this geotechnical study did not include any environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. An Environmental Site Assessment (ESA) is advisable prior to construction.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 SITE DESCRIPTION

Table 2.1 provides a generalized description of the existing site conditions based on visual observations during the field activities, as well as other available information.

TABLE 2.1: SITE DESCRIPTION

Site Location	The project site is located on the north of Airport Road near Paragould, Arkansas. A Site Vicinity Map is provided in the Appendix, based on Google Earth imagery dated March 2024.
Site History	Based on Google Earth earliest imagery since dated March 1994, the site is developed tract of land.
Existing Site Ground Cover	Based on Google Earth imagery, dated March 2024, the proposed site is covered with asphalt pavement.
Existing Grade/Elevation Changes	Based on Google Earth imagery, the existing elevation of the site is relatively level. The existing elevation range between El. +280 to El. +288 feet.
Description of Adjacent Property	North: Vacant Tract of Land East: Vacant Tract of Land South: Airport Road West: Paragould NDB PGR 383
Ground Surface Soil Support Capability	The site was capable to carry the field equipment during field explorations.

2.2 FIELD EXPLORATION

Field exploration for the project consisted of drilling a total of seven (7) soil borings. The boring design element, boring labels, approximate depths and drilling footage are provided in Table 2.2.

TABLE 2.2: FIELD EXPLORATION SUMMARY

Design Element	Boring Designation	Number of Borings	Boring Depth (ft)		Drilling Footage (ft)
			Proposed	Executed	
Building B, C & D	B-1 thru B-3	3	20	21½	64½
Parking Area	B-4 thru B-7	4	6	6½	26
TOTAL:		**7**	**84**		**90½**

The borings were selected and located in the field by PSI personnel using a recreational-grade GPS system. Elevations of the ground surface at the boring location was not provided. The references to elevations of various subsurface strata are based on depths below existing grade at the time of drilling. The approximate boring location is depicted on the Boring Location Plan provided in the Appendix.

The field exploration methods are described in Table 2.3.

TABLE 2.3: FIELD EXPLORATION DESCRIPTION

Drilling Equipment	Truck-mounted drilling rig
Drilling Method	Hollow Stem Augers
Drilling Procedure	Applicable ASTM Standards and PSI Safety Manual
Field Testing	Hand Penetrometer, Standard Penetration Test (ASTM D1586)
Sampling Procedure	Soils: ASTM D1586/ 1587
Sampling Frequency	Continuously to a depth of 10 feet and 5-foot intervals thereafter
Frequency of Groundwater Level Measurements	During drilling and immediately after drilling.
Boring Backfill Procedures	The borings were backfilled with soil cuttings.

During field activities, the encountered subsurface conditions were observed, logged, and visually classified (in general accordance with ASTM D2487). Field notes were maintained to summarize soil types and descriptions, water levels, changes in subsurface conditions, and drilling conditions.

2.3 LABORATORY TESTING PROGRAM

PSI supplemented the field exploration with a laboratory testing program to determine additional engineering characteristics of the subsurface soils encountered. Table 2.4 represents the laboratory testing program.

TABLE 2.4: LABORATORY TESTING PROGRAM

Laboratory Test	Procedure Specification
Visual Classification	ASTM D2488
Moisture Content	ASTM D2216
Atterberg Limits	ASTM D4318
Material Finer than No. 200 Sieve	ASTM D1140

The laboratory testing program was conducted in general accordance with applicable ASTM Test Methods. The results of the laboratory tests are provided on the Boring Logs in the Appendix. Portions of samples not altered or consumed by laboratory testing will be discarded 60 days from the date shown on this report.

Laboratory test data along with detailed descriptions of the soils can be found on the Log of Boring in the Appendix. A key to terms and symbols used on the log is presented in the Appendix.

2.4 SUBSURFACE CONDITIONS

The results of the field and laboratory investigation have been used to generalize a subsurface profile at the project site. The subsurface descriptions mentioned in Table 2.5 provide a highlighted generalization of the major subsurface stratification features and material characteristics.

TABLE 2.5: GENERALIZED SOIL PROFILE

Stratum	Top (ft)*	Bot. (ft)*	Consistency/ Relative Density	Material Description
1	0	4.5		1.5 to 2 inches of Asphalt over 9 to 12 inches of Base Material Fill: Clayey Sand & Gravel
3	3	18	Soft to Stiff	Silty Clay (CL-ML)
4	15	21.5	Loose to Medium Dense	Silty Sand (SM)

**Referenced from existing ground surface at the boring locations at the time of drilling activities.*

The boring logs included in the Appendix should be reviewed for specific information at individual boring locations. The boring logs include soil descriptions, stratifications, locations of the samples, and field and laboratory test data. The descriptions provided on the logs only represent the conditions at the actual boring location; the stratifications represent the approximate boundaries between subsurface materials. The actual transitions between strata may be more gradual and less distinct. Variations may occur and should be expected across the site.

2.4.1 GROUNDWATER INFORMATION

Water level measurements were performed during drilling and after completion of drilling. Specific information concerning groundwater is noted on each boring log presented in the Appendix of this report. The groundwater measurements are summarized in Table 2.6.

TABLE 2.6: MEASURED GROUNDWATER LEVELS (DEPTHS)

Boring Designation	Boring Depth (feet)	During Drilling (feet)	After Drilling (feet)
B-1	21½	7	4
B-2	21½	7	10
B-3	21½	7	10
B-4	6½	6	6
B-6	6½	6	6
B-7	6½	6	6

It is possible that seasonal variations (temperature, rainfall, etc.) will cause fluctuations in the groundwater level. Additionally, perched water may be encountered in discontinuous zones within the overburden soil. It is recommended that the contractor determine the actual groundwater levels at the site at the time of the construction activities to determine the impact, if any, on the construction procedures.

2.5 SEISMIC CONDITIONS AND SITE CLASSIFICATION

The International Building Code (IBC), Latest Edition requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and strata types). As part of the procedure to evaluate seismic forces, the code requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface. The maximum boring depth for this project is 21.5 feet. Based on site subsurface conditions encountered for this investigation, a Seismic Site Class "D" is recommended.

Using this information and the USGS *U.S. Seismic Design Maps* (http://earthquake.usgs.gov/designmaps/us/application.php) and the requirements of International Building Code (IBC) 2018 and Minimum Design Loads for Buildings and Other Structures (ASCE 7-16), the following are mapped acceleration parameters for this site.

The Site Coefficients, Fa and Fv were interpolated from IBC 2018 Tables 1613.3.2(1) and 1613.3.2(2) as a function of the site classifications and the mapped spectral response acceleration at the short (Ss) and 1 second (S1) periods.

TABLE 2.7: GROUND MOTION VALUES

Period (sec)	Mapped MCE Spectral Response Acceleration (g)		Site Coefficients		Adjusted MCE_R Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)	
0.2	S_s	1.477	F_a	1.000	S_{Ms}	1.477	S_{Ds}	0.984
1.0	S_1	0.535	F_v	1.765*	S_{M1}	0.944*	S_{D1}	0.629*

2% Probability of Exceedance in 50 years for Latitude, Longitude: 41.30718°N, 112.01928°W
MCE_R = Maximum Considered Earthquake
* See 11.4.7 in ASCE 7-16

The Site Coefficients referring to ASCE 7-16 Section 11.4.7 require the structural engineer to apply appropriate calculations as needed. The design of structures should comply with the requirements of the governing justification's building codes.

In accordance with ASCE 7-16, Section 11.4.8, for a Site Class D site with S1>0.2, a ground motion hazard analysis be performed per Section 21.2. Section 11.4.8 includes an exception where ground motion hazard analyses is not required for structures where the seismic response coefficient of the structure is determined according to Chapter 12 Section 12.8.

If a thorough evaluation of the Seismic Site Class is desired, PSI can conduct a Refraction Microtremor (ReMi™) study of the site to evaluate the shear wave velocity profile to a depth of 100 feet below the surface. This study involves the placement of geophones on the ground surface and recording vibrations. Through integration of the data, the characteristic shear wave velocity of each below-grade stratum can be interpreted and used to determine the Site Class in accordance with the provisions of the International Building Code 2021.

3.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

3.1 GEOTECHNICAL DISCUSSION

It is our opinion that methods, means, and sequence of the proposed construction, including site preparation, should be the responsibility of the Contractor, who should be specialized in this type of work. However, general geotechnical related discussions are offered herein in this regard for guidance and possible consideration. Prior to commencing with site preparation, positive collection, drainage and discharge of surface water runoff and rainwater away from the construction area should be established and be maintained throughout the construction area and period.

The types and bearing depth of foundations suitable for a given structure depend primarily on several factors including the subsurface conditions, the function of the structure, the loads it may carry, the cost of the foundation, and the criteria set by the Design Engineer with respect to vertical and differential movements which the structure can withstand without damage.

We understand that the existing building within the proposed new parking area will be demolished prior to their construction. Therefore, there is a possibility that the near-surface soils within the footprint of the proposed structures will be disturbed during demolition of the existing structures and/or the removal of any underground utilities, or that the subsurface conditions differ from those encountered at the location of our soil boring. Excavations planned next to existing structures/ foundations shall be avoided as much as possible. Otherwise, Contractor shall provide adequate shoring to the existing foundations to mitigate any distress to the existing structures.

Approximately 3 to 4½ feet of undocumented fill materials were encountered in the borings and it's likely that fill soils may be present in other areas not explored by our exploration program. PSI has not been provided with documentation on the age, placement methods, or any testing information of the existing fill. Based on the results of the exploration program, the fill is granular with variable compaction but is generally moderately compacted with isolated areas of poor compaction. Due to this, PSI recommends that the existing fill be left in place and evaluated with by proof-roll and observation of excavations for footings. Isolated areas of relatively loose existing fill conditions may require recompaction.

Details related to site preparation, foundation design, and construction considerations are included in subsequent sections of this report.

3.2 DEMOLITION OF EXISTING CONCRETE

PSI anticipates that the existing one-story structure is likely supported on relatively shallow footing foundation with a concrete slab. Based on our exploration program, about 2 inches of asphalt paving was found in the existing parking lot area. It is also understood that underground utilities run throughout the proposed site.

As previously discussed, disturbance of the near-surface soils could occur during demolition of the existing concrete and/or the removal of any underground utilities. PSI recommends that all existing concrete slabs, foundations, underground utilities, demolition debris, and soft or highly disturbed soils within the construction area be fully removed. As previously discussed, some variation in the near-surface soils could exist away from the boring locations considering the present and former development of the site. It should

be noted that some of the near-surface soils within the construction area could be fill that was placed during previous construction or will be disturbed during the demolition activities.

It is common practice to use different subcontractors for demolition and grading activities. Thus, it will be necessary to closely monitor the preparation, grubbing, backfill, and compaction of areas to be disturbed by demolition. Excavations should not be "covered up" without proper compaction-controlled backfilling, as this may result in unsatisfactory performance of the new construction. All backfilling of excavations made during demolition activities should be performed in a manner consistent with the placement of structural fill as described in the Site Preparation section of this report.

3.3 SITE PREPARATION

It is not known what type of foundations support the buildings and its associated structures. Voids left by removal of below grade structures or utilities should be backfilled with properly compacted structural fill soils.

On developed sites, other buried debris may exist which is not detected by the soil borings. Any buried debris waste debris or trash which is found during the construction operations should be thoroughly excavated and removed from the site.

PSI recommends that all existing pavements, loose fill materials, underground utilities, demolition debris, vegetation, loose or soft near surface soils, potentially unstable silty layers, and other unsuitable materials within the construction area be stripped from the site and disposed of appropriately. Any voids resulting from the removal of unsuitable materials should be backfilled with properly compacted structural soils.

Following stripping and removal of unsuitable materials at this site, the exposed soil subgrade should be proof-rolled with a loaded tandem axle dump truck or similar pneumatic-tired vehicle having a minimum gross weight of 20 tons. Soils observed to rut or deflect should be undercut and replaced with properly compacted structural fill material as described herein. PSI recommends that proof-rolling and undercutting activities be performed during a period of dry weather and witnessed by a PSI representative.

Once subgrade preparation and observation have been completed, structural fill may be placed as required to reach design grades. Structural fill should be free of organic or other deleterious materials and have a Liquid Limit less than 40 and a Plasticity Index between 10 and 20. On-site soils which meet these criteria could be considered for reuse as structural fill. The structural fill should be placed in maximum lifts of eight inches of loose material and should be compacted to at least 95 percent of the Standard Proctor (ASTM D698) maximum dry density within the range of 0 to +2 percent of the optimum moisture content. If the fill is too dry, water should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. The edges of any compacted fill above the surrounding surface grade should extend at least five (5) feet beyond the edges of the structure area prior to sloping. All fill and bedding materials should conform to the requirements of the local municipality and any other governing agencies as applicable.

Each lift of compacted structural fill should be tested and documented by a PSI representative prior to placement of subsequent lifts. As a guideline, it is recommended that field density tests be performed at a frequency of not less than one test per lift for every 2,500 square feet of fill placed in the building area, or a minimum of four tests per lift, whichever is greater. In parking areas, it is recommended that field density tests be performed at a frequency of not less than one test per lift of every 5,000 square feet of fill placed, or a minimum of four tests per lift, whichever is greater. Tested fill materials not meeting either the required dry

density or moisture content range should be recorded, the location noted, and reported to the Contractor and Owner. A retest of that area should be performed after the Contractor performs remedial measures.

It is extremely important to establish and maintain good and positive drainage with the construction area as soon as practical. Wet or saturated near surface soils could pose significant difficulties during earthwork operations. This good and positive collection and drainage of surface water should be maintained throughout the construction period.

3.4 FOUNDATION DESIGN RECOMMENDATIONS

The following sections outline geotechnical design requirements for the recommended foundation options.

3.4.1 SPREAD FOOTING FOUNDATION OPTION

Provided the site preparation recommendations are followed, the proposed building can be supported on conventional wall footings and isolated spread bearing on suitable soils at least 18 inches below the finished grade and can be designed for a max allowable bearing pressure of 1,800 psf for dead plus sustained live loads. Minimum footing dimension for isolated and continuous wall footing should be at least 24 inches and 18 inches respectively.

Spread footings with a width no larger than seven feet, designed as described above, should experience a total settlement of less than one inch. If a cluster of closely spaced footings (i.e., if the center to center spacing of the footings is less than two times the width of the footing) are planned, PSI should be contacted to calculate the amount of settlement.

The base adhesion/frictional resistance and the passive soil resistance will resist the horizontal loads on shallow foundations. For a footing cast against natural clay soil or compacted soil, the adhesion/frictional resistance and the passive soil resistance values for sustained loading conditions are given herein. For sustained loading conditions, a frictional coefficient of 0.24 and an ultimate passive resistance of 240 psf per foot depth is recommended. A factor of safety of 2.0 is recommended to arrive at the allowable values. Passive resistance from the upper two feet of soil should be neglected. Also, the passive resistance of any un-compacted fill material should be neglected.

The uplift resistance of a shallow foundation formed in an open excavation will be limited to the weight of the foundation concrete and the soil above it. For design purposes, the ultimate uplift resistance can be based on effective unit weights of 120 and 150 pcf for soil and concrete, respectively above the water table. We recommend that buoyant unit weights of 60 pcf for soil and 90 pcf for concrete be utilized in the case of submergence. These values should be reduced by an appropriate factor of safety.

The foundation excavations should be observed by a PSI representative prior to steel or concrete placement to assess that the foundation materials can support the design loads and are consistent with the materials discussed in the report. Soft or loose soil zones, if encountered at the bottom of the shallow footing excavations, may require densification or may require removal and replaced with properly compacted fill as directed by the Geotechnical Engineer.

After opening, isolated spread footing excavations should be observed, and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should

be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

3.4.2 FLOOR SLAB

The floor slabs can be grade supported on properly compacted fill. Site preparation activities including proof-rolling, as discussed earlier in this report, should be accomplished to identify any soft, unsuitable or unstable soils which should be removed from the slab areas prior to fill placement and/or floor slab construction.

We recommend that a minimum 4-inch thick free draining granular mat be placed beneath the slabs on grade to enhance drainage and provide increased subgrade strength. A suitable vapor barrier or vapor retarder should be placed on the granular mats as required by the designer or applicable codes. The slabs on grade should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Based on the existing soil conditions and the site preparation specified herein, the design of slabs on grade can be based on a subgrade modulus (k) of 100 pci; however, this value may be increased to 130 pci if a minimum 4-inch thick granular mat is placed below the floor slabs as recommended above. These subgrade modulus values represent anticipated values that would be obtained in a standard in-situ plate test with a 1-foot square plate. Use of these subgrades moduli for design of other on-grade structural elements should include appropriate modification based on dimensions as necessary.

The value should be adjusted for larger areas using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction,

$$k_s = \left(\frac{k}{B}\right) \text{ for cohesive soil and}$$

$$k_s = k\left(\frac{B+1}{2B}\right)^2 \text{ for cohesionless soil}$$

where: k_s = coefficient of vertical subgrade reaction for loaded area,
k = coefficient of vertical subgrade reaction for 1x1 square foot area, and
B = width of area loaded, in feet.

4.0 PAVEMENT DESIGN RECOMMENDATIONS

4.1 PAVEMENT SUBGRADE PREPARATION

PSI provided recommendations for site preparation previously. As recommended above, after stripping the exposed soil should be proof-rolled to locate any soft or loose areas. Soils that are observed to rut or deflect under the moving load should be undercut and replaced with properly compacted structural fill. The proof-rolling and undercutting activities should be witnessed by a PSI representative and should be performed preferably during a period of dry weather. Proof-rolling and fill placement should be followed as per the "Site Preparation" section of this report.

4.2 PAVEMENT DESIGN

AASHTO design methodology could be used to design the pavements. According to AASHTO design methodology, the pavement design thickness considers pavement performance, traffic, subgrade soils, pavement materials, environment, drainage, and reliability. Traffic includes various types of vehicles with various magnitudes of axle loads that the pavement may be subjected to during its service life. The design involves a traffic analyses that converts various types of vehicles with various magnitudes axle loads to a number of 18-kip equivalent single axle load (ESAL) repetitions. The Design Engineer should perform the traffic analyses to compute the number of ESAL repetitions that the pavement will be subjected to during its service life or design life. Based on the computed ESAL values, an economical and appropriate pavement can be designed accordingly.

In order to design a pavement, the subgrade soil conditions, and anticipated levels of traffic must be known. The subgrade soils at the site were evaluated based on our limited testing. The anticipated traffic on the proposed pavement is not known at this time. Based on our previous experience with similar facilities, the traffic for the proposed pavement is expected to consist primarily of passenger cars and light pickup trucks, with occasional heavier vehicles such as delivery trucks. If this data is not correct, PSI should be contacted to re-evaluate this design.

Based on AASHTO design methodology and our experience with similar projects in the local area, we are providing pavement thickness for both rigid and flexible pavement systems in Tables 4.1 and 4.2, respectively. These tables include pavement sections corresponding to generic traffic levels (total ESALs). In general, pavement thicknesses corresponding to the light-duty traffic conditions may be considered for parking areas, while the heavy-duty traffic condition should be used for driveways, entry/exit lanes, and other frequently used areas. Pavements within trash pick-up areas should be Portland cement concrete and at least 7 inches in thickness.

TABLE 4.1: RIGID PAVEMENT DESIGN THICKNESS

Pavement Material(s)	Life Expectancy, ESALs	
	Light Duty 116,000	Heavy Duty 200,000
	Design Thickness (inch)	
Portland Cement Concrete	5.0	7.0
Subgrade or Subbase	See Site Preparation Section	

TABLE 4.2: FLEXIBLE PAVEMENT DESIGN THICKNESS

Pavement Material(s)	Life Expectancy, ESALs	
	Light Duty 15,000	Heavy Duty 75,000
	Design Thickness (inch)	
Hot Mix Asphalt Concrete	2.0	3.0
Crushed Aggregate Base	6.0	8.0
Subgrade or Subbase	See Site Preparation Section	

The pavement sections provided in Table 4.1 & 4.2 are minimum thickness recommended, corresponding to the ESALs mentioned. The final pavement sections should be adjusted by the project Civil Engineer based the actual design traffic loading criteria for the project when that information becomes available. PSI can assist with the final pavement section design if requested.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce the potential for cracking. Construction joints should be designed in accordance with the current Portland Cement Association and the American Concrete Institute guidelines. Joints should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils. Load transfer devices at the pavement joints should be designed in accordance with accepted codes. The concrete should have a minimum compressive strength of 4,000 psi at 28 days. The concrete should also be designed with 5±1 percent entrained air to improve workability and durability. Normal periodic maintenance will be required.

4.2.1 CIVIL AND DRAINAGE CONSIDERATIONS

Related civil design factors such as drainage, cross-sectional configurations, surface elevations and environmental factors which will significantly affect the service life of the pavement must be included in the preparation of the construction drawings and specifications. Concrete pavement slabs should be provided with adequate steel reinforcement. Proper finishing of concrete pavements requires the use of sawed and sealed joints. Joint spacing should be determined by the structural engineer. Dowel bars should be used to transfer loads at the transverse joints.

Surface water infiltration to the pavement subgrade layers may soften the subgrade soils. Considering several factors in the pavement design can reduce surface infiltration. To summarize, the following are some of the factors that need to be emphasized in order to maintain proper drainage.

- Appropriate slopes should be provided.
- Joints should be properly sealed and maintained.
- Side drains or sub drains along a pavement section may be provided.
- Proper pavement maintenance programs such as sealing surface cracks, and immediate repair of distressed pavement areas should be adopted.
- During and after the construction, site grading should be kept in such a way that the water drains freely off the site and off any prepared or unprepared subgrade soils. Excavations should not be kept open for a long period of time.

5.0 CONSTRUCTION CONSIDERATIONS

PSI should be retained to provide observation and testing of construction activities involved in the foundations, earthwork, and related activities of this project. PSI cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundations if not engaged to also provide construction observation and testing for this project.

5.1 MOISTURE SENSITIVE SOILS/WEATHER RELATED

During wet weather periods and/or poor site drainage, an increase in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Soils that become wet might be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

5.2 DRAINAGE CONCERNS

Water should not be allowed to collect in foundation excavations or on prepared subgrade of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the foundation. The grades should be sloped away from the foundation and surface drainage and roof drainage should be collected and discharged such that water is not permitted to infiltrate and/or accumulate within the foundation or any backfill areas.

5.3 EXCAVATIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations etc. be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "competent person", as defined in 29 CFR Part 1926.650 to 652 should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case, should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

5.4 PAVEMENT CONSTRUCTION

The importance of good drainage cannot be over-emphasized. Construction of the pavement improvement should only be attempted when the subgrade is dry and stable and after good drainage has been established at the site. If the near-surface soils are not well drained prior to and during construction, pumping of the upper soils may occur which will inhibit compaction of the rigid pavement base. In such cases, the upper soils

would need to be stripped from the site and replaced with pavement base or subbase material. A geotextile fabric could be placed beneath the pavement base or subbase to separate it from the subgrade.

It is our opinion that the means, methods, and sequence of construction of the pavements are the responsibility of the Contractor, who should be experienced in this type of construction. It should be noted that the geotechnical recommendations provided herein with regard to concrete, base, and subbase section thicknesses are based on the traffic conditions analyzed. This includes the recommended total improved thickness for areas restricted to automobiles and light truck traffic, as well as for areas subjected to heavier traffic (delivery trucks, garbage trucks, etc.). However, the fully or partially constructed surface improvements may be subjected to heavier construction equipment; therefore, appropriate measures should be taken by the Contractor in terms of site preparation, base placement and compaction, and selection of equipment to assure the satisfactory performance of pavements both during and after construction.

5.5 CONSTRUCTION MONITORING

Consideration should be given to the impact of all of the proposed construction activities on the integrity and stability of any other existing structures and their foundation systems located within the immediate vicinity of the proposed project. A detailed QA/QC program should be developed and strictly followed throughout the project. This may include performing a thorough preconstruction inspection of the site and the surrounding structure conditions including any existing distress, cracks, movements, etc. The QA/QC program should include close monitoring of construction vibrations and movements, stability of excavations, dewatering activities, etc. and their possible impact on any adjacent existing structures. This could include the use of videotaping, photographs, instrumentation, sensors, geodetic surveys, etc. Vibrations due to new construction activities should be expected and they should be monitored. In general, vibrations should be limited to about 0.25 inch/sec. (peak particle velocity) at all existing nearby sensitive structures. If this value is exceeded, further consideration should be given to the effects of vibrations and the methods, means and sequence of construction operations. In addition, the selected Contractor should be specialized in this type of construction and capable of assuring the integrity of the surrounding structures including the use of any necessary shoring, underpinning, bracing, etc. as needed.

We are providing this information solely as a service to our Client. PSI does not assume responsibility for construction site safely or the Contractor's or other party's compliance with local, state, and federal safely or other regulations.

6.0 REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by the client for the proposed project. If there are revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional Geotechnical Engineering practices in the local area. No other warranties are implied or expressed. This report may not be copied without the expressed written permission of PSI.

After the plans and specifications are more complete, the Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that the engineering recommendations have been properly incorporated in the design documents. At this time, it may be necessary to submit supplementary recommendations. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

This report has been prepared for the exclusive use of Lewis Architects Engineers for specific application to the proposed Paragould Public Works to be constructed on Airport Road near Paragould, Arkansas.

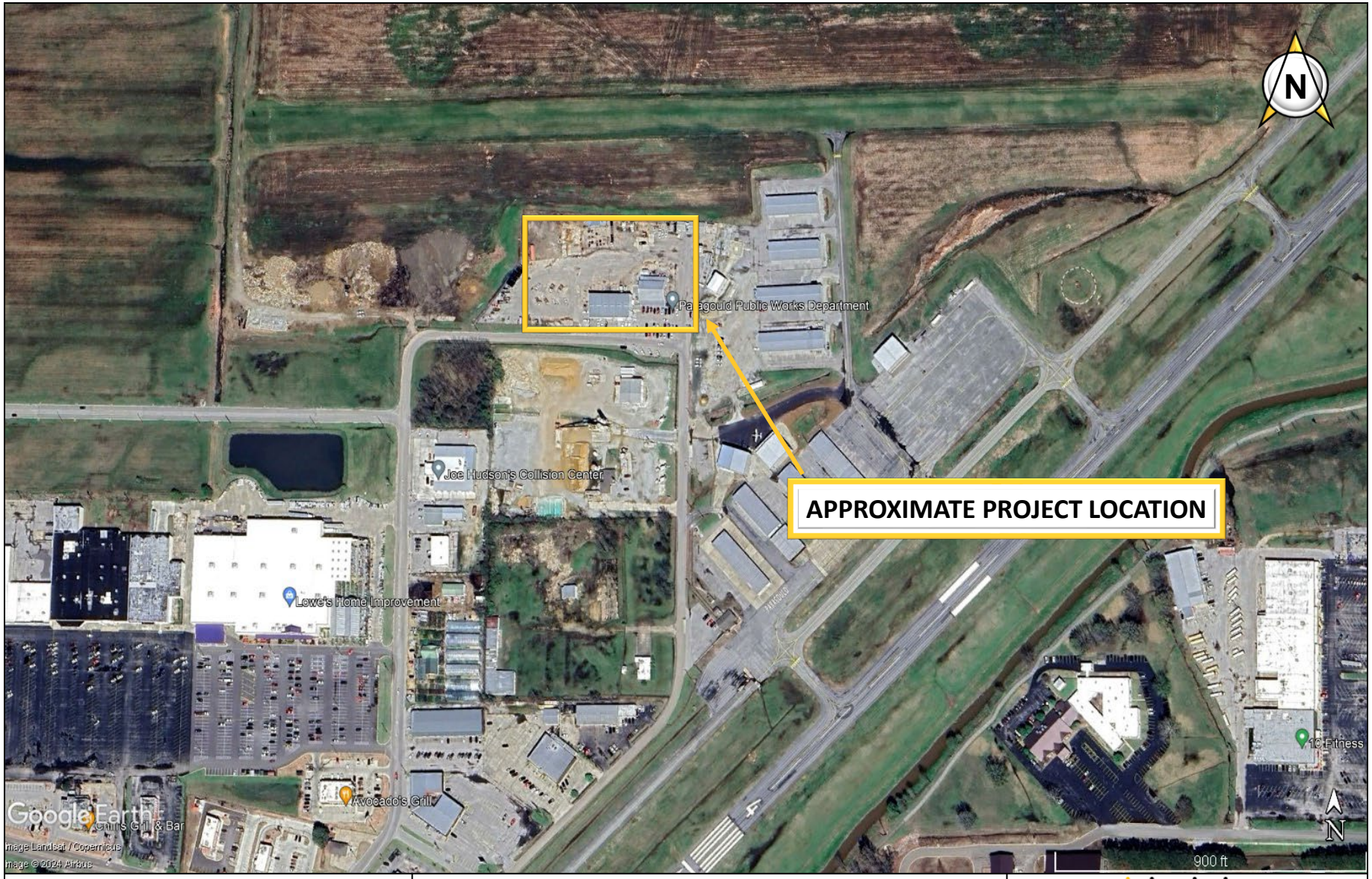
APPENDIX

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED PARAGOULD PUBLIC WORKS
PARAGOULD, ARKANSAS

SITE VICINITY MAP (GENERAL)

GOOGLE EARTH IMAGERY DATE: 03/2024
PSI PROJECT NO.: 0514583

intertek psi

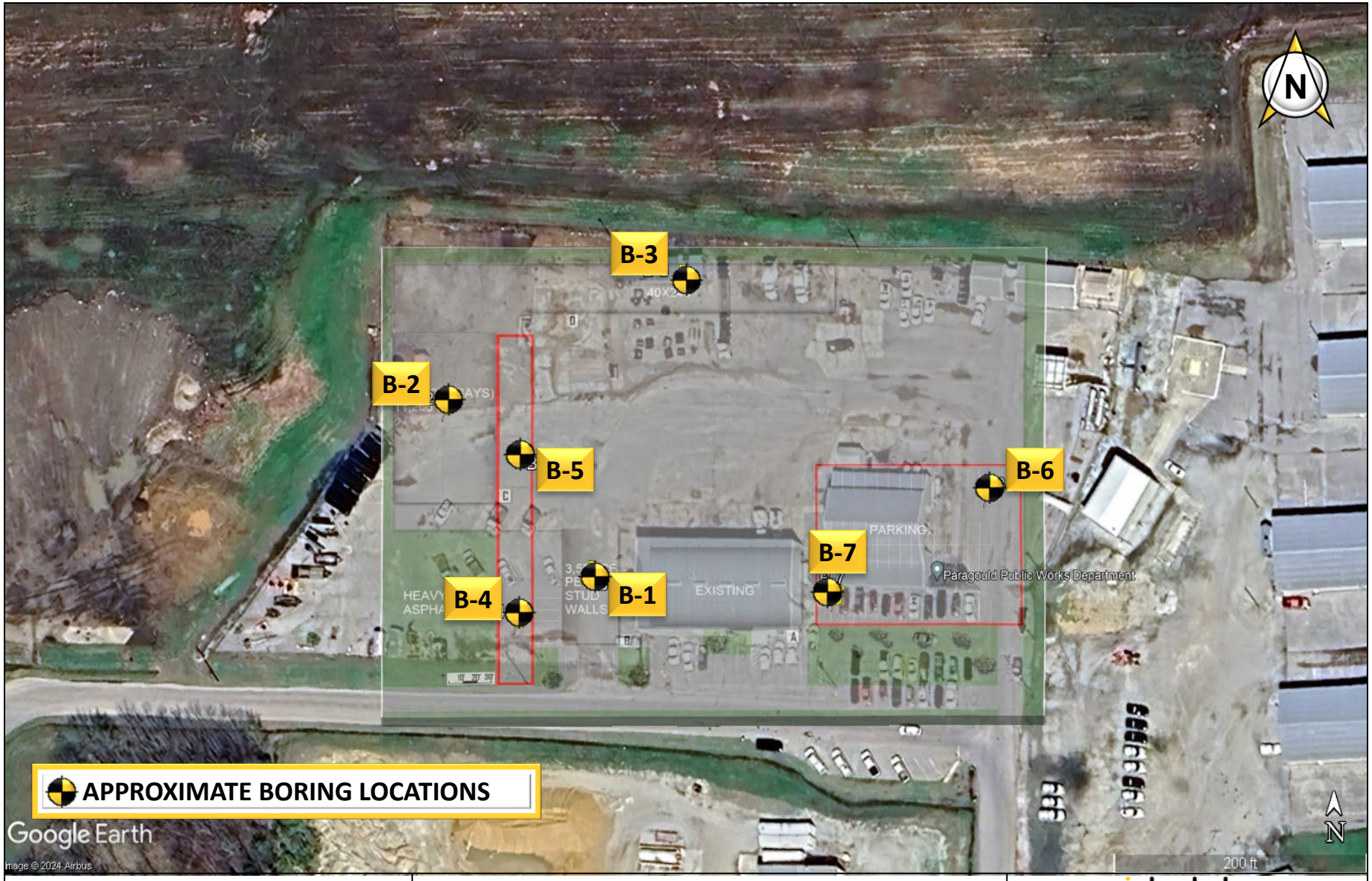


GEOTECHNICAL ENGINEERING SERVICES
PROPOSED PARAGOULD PUBLIC WORKS
PARAGOULD, ARKANSAS

SITE VICINITY MAP (CLOSE UP)

GOOGLE EARTH IMAGERY DATE: 03/2024
PSI PROJECT NO.: 0514583

intertek psi



GEOTECHNICAL ENGINEERING SERVICES
PROPOSED PARAGOULD PUBLIC WORKS
PARAGOULD, ARKANSAS

BORING LOCATION PLAN

GOOGLE EARTH IMAGERY DATE: 03/2024
PSI PROJECT NO.: 0514583

intertek psi

BORING B-1

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	21.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.063786°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.513256°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water		
	While Drilling	7
	Upon Completion	4
	Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ Moisture PL LL (0 25 50) STRENGTH, tsf Qu Qp (0 2.0 4.0)	Additional Remarks
	0					2 Inches of Asphalt over 12 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		13-25-26 N=51	5		-200=15.5%
				2	18	Firm, Brown and Gray, **SILTY CLAY (CL-ML)**		3-3-4 N=7	21		LL = 25 PL = 18 -200=95.5%
	5			3	18			3-3-3 N=6	23		
				4	18		CL-ML	3-3-3 N=6	24		
	10			5	18			3-3-3 N=6	25		
	15			6	18	Loose to Medium Dense, Brown, **SILTY SAND (SM)**	SM	3-3-4 N=7	18		-200=36.11%
	20			7	18			5-7-7 N=14	16		
						End of Boring at 21.5 Feet					

intertek psi

Professional Service Industries, Inc.
404 Manson Road, Suite 130
Sherwood, AR 72120
Telephone: (501) 813-6594

PROJECT NO.: 0514583
PROJECT: Paragould Public Works
LOCATION: 600 Airport Road
Paragould, AR
72450

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	21.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.064119°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.513633°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water

While Drilling	7
Upon Completion	10
Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2 Inches of Asphalt over 12 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		10-13-16 N=29	5		
				2	18			12-5-3 N=8	14		LL = 30 PL = 20 -200=41.5%
	5			3	18	Firm, Brown and Gray, **SILTY CLAY (CL-ML)**		2-2-3 N=5	26		
				4	18			3-4-3 N=7	25		
	10			5	18		CL-ML	2-2-2 N=4	28		
	15			6	18			3-2-3 N=5	25		
	20			7	18	Medium Dense, Brown, **SILTY SAND (SM)**	SM	6-9-12 N=21	19		-200=14.5%
						End of Boring at 21.5 Feet					

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Professional Service Industries, Inc.
404 Manson Road, Suite 130
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Telephone: (501) 813-6594

PROJECT NO.: 0514583
PROJECT: Paragould Public Works
LOCATION: 600 Airport Road
Paragould, AR
72450

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-3

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	21.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.064378°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.513019°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water		
	While Drilling	7
	Upon Completion	10
	Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / Moisture / PL / LL (0, 25, 50) / STRENGTH, tsf Qu / Qp (0, 2.0, 4.0)	Additional Remarks
	0					2 Inches of Asphalt over 12 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		6-12-8 N=20	14		
				2	18	Firm, Brown and Gray, **SILTY CLAY (CL-ML)**		2-1-4 N=5	14		
	5			3	18			5-4-4 N=8	26		LL = 25 PL = 18
				4	18			2-3-4 N=7	27		
	10			5	18		CL-ML	2-3-5 N=8	26		
	15			6	18			2-2-3 N=5	25		
						Dense, Gray, **SILTY SAND (SM)**	SM				
	20			7	18			10-18-21 N=39	21		
						End of Boring at 21.5 Feet					

intertek psi

Professional Service Industries, Inc.
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Telephone: (501) 813-6594

PROJECT NO.:	0514583
PROJECT:	Paragould Public Works
LOCATION:	600 Airport Road
	Paragould, AR
	72450

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-4

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	6.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.063694°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.513447°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water		
	While Drilling	6
	Upon Completion	6
	Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2 Inches of Asphalt over 12 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		8-8-5 N=13	5		-200=20.5%
				2	18	Soft to Firm, Brown and Gray, **SILTY CLAY (CL-ML)**	CL-ML	2-1-2 N=3	20		
	5			3	18 ▼			2-3-3 N=6	23		
						End of Boring at 6.5 Feet					

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Professional Service Industries, Inc.
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Sherwood, AR 72120
Telephone: (501) 813-6594

PROJECT NO.:	0514583
PROJECT:	Paragould Public Works
LOCATION:	600 Airport Road
	Paragould, AR
	72450

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-5

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	6.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.064028°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.513442°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water		
	While Drilling	Dry
	Upon Completion	Dry
	Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2 Inches of Asphalt over 9 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		5-4-4 N=8	12		
				2	18			3-13-25 N=38	15		LL = 26 PL = 15 -200=36%
	5					Firm, Brown and Gray, **SILTY CLAY (CL-ML)**	CL-ML				
				3	18			5-5-3 N=8	17		
						End of Boring at 6.5 Feet					

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PROJECT NO.:	0514583
PROJECT:	Paragould Public Works
LOCATION:	600 Airport Road
	Paragould, AR
	72450

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-6

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	6.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.06395°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.512211°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water		
	While Drilling	6
	Upon Completion	6
	Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					1.5 Inches of Asphalt over 12 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		5-6-5 N=11	20		-200=41%
				2	18	Firm, Brown and Gray, **SILTY CLAY (CL-ML)**	CL-ML	4-3-2 N=5	21		
	5			3	18 ▼			2-3-3 N=6	26		
						End of Boring at 6.5 Feet					

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PROJECT NO.: 0514583
PROJECT: Paragould Public Works
LOCATION: 600 Airport Road
Paragould, AR
72450

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-7

DATE STARTED:	7/1/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	7/1/24	**DRILLER:** JS	**LOGGED BY:** RV
COMPLETION DEPTH	6.5 ft	**DRILL RIG:**	B-46
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:	36.063742°	**HAMMER TYPE:**	Automatic
LONGITUDE:	90.512611°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	MS

REMARKS: N/A - Not Available

Water		
	While Drilling	6
	Upon Completion	6
	Delay	N/A

BORING LOCATION:
See Boring Location Plan

Paragould, AR

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2 Inches of Asphalt over 12 Inches of Base Material					
				1	18	Fill - Brown and Gray **CLAYEY SAND (SC)** with Gravel		11-8-6 N=14	8		
				2	18	Firm to Stiff, Brown and Gray, **SILTY CLAY (CL-ML)**	CL-ML	3-4-5 N=9	22		LL = 25 PL = 18 -200=92.5%
	5			3	18 ▼			2-2-2 N=4	25		
						End of Boring at 6.5 Feet					

intertek psi

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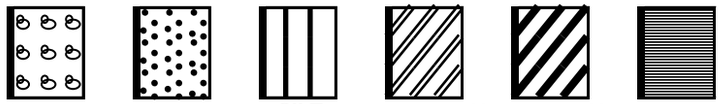
Sherwood, AR 72120
Telephone: (501) 813-6594

PROJECT NO.: 0514583
PROJECT: Paragould Public Works
LOCATION: 600 Airport Road
Paragould, AR
72450

The stratification lines represent approximate boundaries. The transition may be gradual.

KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE

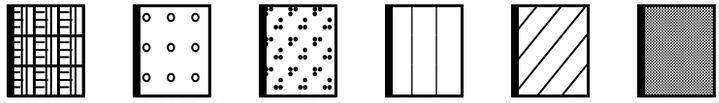


GRAVEL | SAND | SILT | LEAN CLAY | FAT CLAY | PEAT

SAMPLER TYPE

NO SAMPLE | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

MODIFIERS

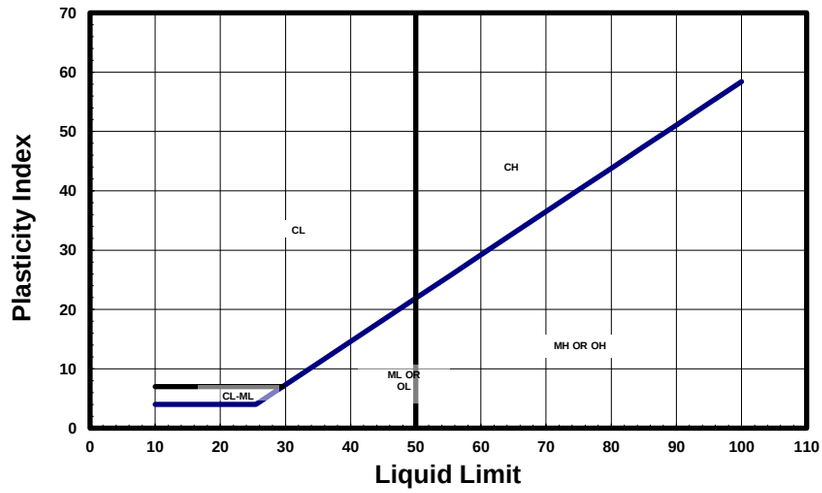


STONE | GRAVELY | SANDY | SILTY | CLAYEY | MISC.

(SEE TEXT ON LOG)

NO RECOVERY | ROCK CORE | 2" SHELBY TUBE | TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487



CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT^2
VERY SOFT	0 TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0 TO 4
LOOSE	5 TO 9
MEDIUM DENSE	10 TO 29
DENSE	30 TO 50
VERY DENSE	> 50 OR 50+

DEGREE OF PLASTICITY OF COHESIVE SOILS

DEGREE OF PLASTICITY	PLASTICITY INDEX	SWELL POTENTIAL
NONE OR SLIGHT	0 TO 4	NONE
LOW	4 TO 20	LOW
MEDIUM	20 TO 30	MEDIUM
HIGH	30 TO 40	HIGH
VERY HIGH	> 40	VERY HIGH

MOISTURE CONDITION COHESIVE SOILS

DESCRIPTION	CONDITION
Absence of moisture, dusty, dry to touch	DRY
Damp but no visible water	MOIST
Visible free water	WET

CONSISTENCY OF COHESIVE SOILS AFTER TERZAGHI (1948)

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY SOFT	< 2
SOFT	2 TO 4
FIRM	4 TO 8
STIFF	8 TO 15
VERY STIFF	15 TO 30
HARD	> 30

ABBREVIATIONS

HP - HAND PENETROMETER
TV - TORVANE
MV - MINIATURE VANE
UC - UNCONFINED COMPRESSION TEST
UU - UNCONSOLIDATED UNDRAINED TRIAXIAL
CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

FINAL GROUND WATER LEVEL

INITIAL GROUND WATER LEVEL

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

6"	3"	3/4"	4	10	40	200

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

152	76.2	19.1	4.76	2.0	0.42	0.074	0.002

GRAIN SIZE IN MM

intertek psi

Geotechnical Consulting Services
404 Manson Rd, Suite 130
Sherwood, Arkansas 72120

Section 01 11 00

SUMMARY OF WORK

PART ONE - GENERAL

1.1 WORK COVERED BY THE CONTRACT DOCUMENTS

A. The work generally consists of:

1. Renovation of existing Public Works Building at 600 Airport Road including new interior spaces, exterior sectional doors and exterior metal wall panels.
2. New 3,500 SF one-story office building using pre-engineered metal building with light gage metal framing construction.
3. New 80'x142' pre-engineered metal building with two enclosed bays and five open bays.
4. New 40'x242' pre-engineered metal building with two enclosed bays and ten open bays.
5. Site work for new building, parking lots, green space, and drives as shown on 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 CONTRACT TIME

A. The Contract Time shall be that time set forth in the Bid Form.

1.4 COORDINATION OF WORK

A. At no time shall the construction under this contract interfere with the normal operation of school activities nor in any way shall materials or equipment used in this work be allowed to block or interfere with school traffic at any exit or entrance doors to classrooms. If necessary, work shall be interrupted when children are nearby, so that there is no hazard to any of the occupants of the building.

B. Debris shall be removed at the end of each working day.

1.5 CONTINGENCY ALLOWANCE

A. 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

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 work at existing building A (interior and exterior) as well as the two heavy duty drives on south side of existing Building A. MTL-2 at Building B shall be MTL-1 (use PBR panel in lieu of concealed fastener vertical panels).

B. Deductive Alternate No. 2: State the amount to be deducted from the Base Bid to omit Building C in its entirety and the 8" slabs of Building C. Grading shall remain as shown on the Civil drawings.

C. Deductive Alternate No. 3: State the amount to be deducted from the Base Bid to omit Building D in its entirety, its 8" slab and the 10" perimeter concrete. Grading shall remain as shown on the Civil drawings.

D. Deductive Alternate No. 4: State the amount to be deducted from the Base Bid to use epoxy paint in lieu of FRP at Building B. Use MTL-1 in lieu of MTL-2 at Building A and B.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

Section 01 31 19

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), pre-fabricated steel building contractor, 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 General 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 General 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

Section 01 33 23

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. Details shall be identified by reference to sheet and detail, schedules, or room numbers shown on the Contract Drawings.
3. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
4. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
5. 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).
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

Section 01 45 29

TESTING LABORATORY SERVICES

PART ONE – GENERAL

1.1 WORK INCLUDED

A. The Owner will employ and pay for the services of an independent testing laboratory to perform specified testing, except where designated otherwise in the Specification Sections.

1. Contractor shall cooperate with the laboratory to facilitate the execution of the required services.
2. Employment of the laboratory by the Owner shall in no way relieve the Contractor's obligations to perform the Work of the Contract.

B. The Owner will pay for all initial services of the testing agency. Similar services required of the Contractor, as outlined in 3.4 - Contractor’s Responsibilities, shall be born by the Contractor.

C. Testing laboratory curing and testing is required for cast-in-place concrete. See Section 03 31 00 - Cast-in-Place Concrete.

1.2 RELATED WORK

A. Related requirements in other parts of the Project Manual:

1. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities: General Conditions of the Contract.

B. Related requirements specified in other sections:

1. Certification of products: The respective sections of Specifications.
2. Test, adjust and balance of equipment: The respective Sections of Specifications.
3. Laboratory tests required, and standards for testing: Each specification section listed.

1.3 QUALITY ASSURANCE

A. The testing laboratory employed by the Owner will meet "Recommended Requirements for Independent Laboratory Qualification" published by the American Council of Independent Laboratories.

B. In its work on this project, the testing laboratory will be required to meet the basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".

1.4 SUBMITTALS

A. Submit a written report of each test and inspection to the following:

1. Architect
2. Contractor
3. Project Record file at job site

PART TWO - PRODUCTS

Not used.

PART THREE - EXECUTION

3.1 DUTIES OF TESTING LABORATORY

A. Cooperate with Architect and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.
2. Ascertain compliance of materials with Requirements of the Contract Documents.

C. Promptly notify Architect and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit copies of the written report of each test and inspection as required in Article 1.4 above.

3.2 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. The testing laboratory is not authorized to:

1. Release, revoke, alter or enlarge on the requirements of the Contract Documents.
2. Approve or accept any portion of the Work.
3. Perform any duties of the Contractor.

3.3 FIELD WORK BY TESTING LABORATORY

A. The testing laboratory personnel shall supply field services under the following limitations:

1. There will be no laboratory field services provided for concrete work. Under the requirements of the concrete work, the General Contractor shall secure and deliver all samples for testing and the lab shall perform laboratory tests only.
2. Samples of proposed fill material shall be secured by the contractor's personnel and delivered to the laboratory for testing. (See 3.4.2 below.)
3. Laboratory field work is acceptable for the taking of compaction readings. The general contractor shall coordinate the tests, to be certain compacted soil is ready for testing so as to avoid unnecessary re-tests.

3.4 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel and provide access to the Work and to Manufacturer's operations.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing. The cost of securing and delivery to the laboratory shall be born by the Contractor.

C. Provide to the laboratory the proposed design mix to be used for concrete and other material mixes which require control by the testing laboratory.

D. Furnish copies of products test reports as required.

E. Furnish incidental labor and facilities:

1. To provide access to the Work to be tested.
2. To obtain and handle samples at the project site or at the source of the product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test specimens.

F. Notify the laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

G. Provide all required time within the construction schedule for the testing laboratory to perform its tests and to issue each of its tests and to issue each of its findings.

H. Provide at the site three extra standard test cylinder molds for emergency use.

END OF SECTION

Section 01 50 00

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. Temporary utilities such as heat, water and electricity.
2. Field Offices and sheds.
3. Sanitary facilities.
4. 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 and with utility company requirements.

1.3 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with utility company, provide service required for power and lighting, and pay all costs for service and for power used.

B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

1.4 TEMPORARY HEAT AND VENTILATION

A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.

B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.

C. Portable heaters shall be standard approved units complete with controls.

D. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

1.5 TEMPORARY WATER

A. Arrange with utility to provide temporary water service for construction.

B. Install necessary branch piping:

1. Locate taps so that water is available throughout the construction by the use of hoses.
2. Protect piping and fittings against freezing.

1.6 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.

1.7 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.

1.8 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.

1.9 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.

1.10 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

Section 01 74 23

FINAL CLEANING

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

Section 01 77 19

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 buildings. If the Architect determines that the state of preparedness is as represented, the punch list will promptly be started on the buildings.

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 plumbing fixtures, trim, 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 two (2) USB flash drives – one (1) for the Architect and one (1) for the Owner.

1. Shop Drawings:
An approved copy of each shop drawing, manufacturer’s brochures, test data, etc., submitted to the Architect for approval during the course of construction shall be included with an index listing material, manufacturer and subcontractor of each submittal.

2. Operating Manuals:
Include all operating and instruction manuals (not submittals, shop drawings, etc.) for all material, equipment or assemblies furnished or installed as part of this contract. All items shall be arranged in alphabetical order and shall include an index of contents as its first page with name of subcontractor and material supplier on each separate item.

3. Record Documents:
Provide, as described in Section 01 78 39, one (1) set of project record documents, with all dimensions of utility locations, variances from original drawings, etc., clearly documented in red.

4. The following shall also be included:

a. Project Directory: Complete listing of all subcontractors, mechanics, and material suppliers involved in the work under this contract.

b. Guarantees/Warranties: Submit signed and notarized copies of all manufacturers, mechanics, contractors or supplier guarantees required by the contract documents, including General Contractor's one 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.

c. AIA Forms:

1) AIA Document G704 – Certificate of Substantial Completion issued by the Architect. (To be signed by Owner, Architect, and Contractor.)

2) AIA Document G706* - Contractor's Affidavit of Payment of Debts And Claims (To be completed by the General Contractor.)

3) AIA Document G706A* - Contractor's Affidavit of Release of Liens (To be completed by the General Contractor.)

4) AIA Document G707* - Consent of Surety Company to Final Payment (To be completed by the General Contractor.)

*Forms can be obtained from:
AIA Dallas, (214)764-3153, www.aiadallas.org or www.aia.org

d. 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.

PART TWO – PRODUCTS

Not Used.

PART THREE – EXECUTION

Not Used.

END OF SECTION

Section 01 78 39

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 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. Depths of various elements of foundation in relation to finish first floor elevation.
   2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
4. Field changes of dimension and detail.
5. Changes made by Field Order or by Change Order.
6. 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

Section 02 41 00

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

Section 03 11 00

CONCRETE FORMS

PART ONE - GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to the General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 COOPERATION

This Contractor is cautioned to examine all drawings and specifications relating to other branches of the work, and he shall make proper provisions to receive all other work.

1.3 SCOPE

Shall include all formwork and related items required to complete the work indicated on the drawings and/or specified herein.

1.4 DESIGN OF FORMWORK

Design and engineering of formwork, as well as its construction shall be the responsibility of the Contractor and shall comply with chapters 2 and 3 of ACI-347, and applicable requirements of the controlling local building code.

1.5 NOTICE FOR OBSERVATION BY ARCHITECT

The Contractor shall give the Architect advance notice, 72 hours before excavations or formwork will be ready to be observed by Architect. The Contractor shall also give a 24-hour second notice before excavations or formwork, including reinforcing steel and any other built-in material or equipment, is complete and ready to be observed by Architect.

PART TWO - MATERIALS

2.1 Form material shall be B-B Plyform EXT DFPA for surfaces not exposed to view.

2.2 Form material shall be HDO EXT-DFPA, high-density overlay plywood for exposed architectural concrete.

2.3 Commercially manufactured steel forms are acceptable.

2.4 Form ties shall have plastic cones to facilitate patching.

2.5 Form accessories to be partially or wholly embedded in concrete, such as ties and hangers, shall be commercially manufactured type. Wire is not acceptable. Portion remaining within concrete shall leave no metal within one inch of surface when concrete is exposed to view. Spreader cones on ties shall not exceed one-inch diameter. All form accessories to be used in concrete having a face exposed to weather shall be galvanized.

PART THREE - EXECUTION

3.1 WORKMANSHIP

A. At contraction, expansion and construction joints, including keyways, neatly joint forms and securely set to exact grade and alignment. Provide sufficient rigidity and strength to resist pressure of concrete without springing, deflecting, or settling.

B. Accurately set edge forms and intermediate screed strips to produce designed elevations and contours in finished surface. Forms shall be sufficiently strong to support vibrating bridge screed or roller pipe screeds if nature of finish specified requires use of such equipment. Align concrete surface to contours of screed strips by use of strike-off templates or approved compacting type screeds.

C. Positive means of adjustment (wedges or jacks) of shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. They shall be securely braced against lateral deflections.

3.2 TOLERANCES

A. Construct formwork so as to insure that concrete surfaces will conform to tolerances of Section 2.4.1, ACI 347.

3.3 PREPARATION OF FORM SURFACES

A. Forms shall be sufficiently tight to prevent leakage of grout or cement paste. Board forms having joints opened by shrinkage of wood shall be swelled until closed by wetting before concrete is placed.

B. Seal plywood and other wood surfaces subject to shrinkage against absorption of moisture from concrete by either a field applied commercial form oil or sealer or a factory applied non-absorptive liner.

C. When steel forms are coated to prevent bond with concrete, it shall be done prior to placing of reinforcement. Excess form coating material shall not be allowed to come in contact with concrete against which fresh concrete will be placed.

D. Clean all form surfaces before re-use.

3.4 REMOVAL OF FORMS

A. Formwork for columns, walls, sides of beams and other parts not supporting weight of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations.

B. Whenever formwork is removed during curing period, exposed concrete shall be cured by one of the methods specified in Section 03 31 00.

C. When shores and other vertical supports are so arranged that form facing material may be removed without loosening or disturbing shores and support, facing material may be removed at an earlier age as specified or permitted. Shores and supports shall remain in place until concrete has reached its specified 28 day strength, unless otherwise specified or permitted.

END OF SECTION

Section 03 15 00

CONCRETE ACCESSORIES

PART ONE - GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to the General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 COOPERATION

This Contractor is cautioned to examine all drawings and specifications relating to other branches of the work, and he shall make proper provisions to receive all other work.

1.3 SCOPE

Shall include all concrete accessories required to complete the work indicated on the drawings and/or specified herein.

1.4 SUBMITTALS

Contractor shall submit one hard copy (not to be returned) and one electronic copy in PDF format as per Section 01 33 23 of products to be used for approval by the architect.

PART TWO - MATERIALS

2.1 Vapor Barrier: See Specification Section 07 26 16

2.2 Construction Joints: 24 gauge galvanized steel with dowel knockouts, depth to match slab thickness. Longitudinal keys at least 1 ½" deep. Provide stake/keyway interlock continuous at top of keyway. Provide stakes and splices. Acceptable Manufacturer's:

1. Key-Loc Joint System by Form-A-Key Products Division
2. Quickey by BoMetals, Inc.
3. Screed Key by Dayton Superior

2.3 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.

2.4 Non-shrink grout shall be Five Star Grout as manufactured by U. S. Grout Corporation or Enduro 50 by Conspec.

2.5 Expansion joint cover refer to Miscellaneous Metals, Section 05 50 00.

PART THREE - EXECUTION

3.1 Control joints, expansion joint material and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves and inserts shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.2 Vapor Barrier. Install under all interior concrete slabs on grade, including ramps and steps. See Section 07 26 16 of Specifications for installation.

3.3 Non-shrink Grout. Place non-shrink grout under all steel bearing conditions, as shown on the drawings.

END OF SECTION

Section 03 20 00

CONCRETE REINFORCEMENT

PART ONE - GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to the General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 COOPERATION

This Contractor is cautioned to examine all drawings and specifications as relating to other branches of the work and he shall make proper provisions to receive all other work.

1.3 SCOPE

Shall include all reinforcing required to complete the work indicated on the drawing and/or specified herein.

1.4 SUBMITTALS

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 bolt setting plans before fabrication shipment. Show all dimensions necessary for reference to contract drawings. Also, wall, beam and column elevations showing placing of reinforcing steel shall be drawn for all concrete wall, beams and columns

PART TWO - MATERIALS

2.1 Metal accessories, including spacers, chairs, ties and other devices necessary for properly assembling, placing, spacing and supporting all reinforcement in place shall be provided.

2.2 Metal reinforcement shall be deformed bars (ACI 318), conforming to one of the following requirements. ASTM Standards for:

A. Billet-steel Bars for Concrete Reinforcement, A615 Latest Revision. Use Grade 60 if not specified.

B. Welded steel Wire Fabric for Concrete Reinforcement, A185 Latest Revision. Provide welded steel wire fabric in sheets.

C. All reinforcing bars shall be clearly imprinted with the mill mark, bar size and steel type.

2.3 Tension Splice Devices

A. Zap Screwlok by Barsplice Products, Inc.

B. Quick-Wedge Mechanical Lap Splices by Erico Products, Inc.

C. Lenton Taper Threaded Rebar Splices by Erico Products.

PART THREE - EXECUTION

3.1 GENERAL

Metal reinforcement shall not be bent or straightened in a manner that will injure the materials. Bars with kinks and bends not shown on the plans will be rejected. All reinforcement shall be accurately placed as called for and tied securely with wire at intersections and at laps. All reinforcement needed in any one section shall be placed in position and inspected and approved by the Architect before concreting is begun, and every care taken not to disturb or misplace such reinforcing during the concreting operation. There shall not be less than 1-5/8" between bars, and parallel bars shall not be wired together.

3.2 Unless otherwise noted on the drawings, all concrete slabs-on-grade, including floor and walk slabs, shall receive 6 x 6 - W1.4 x W1.4 welded wire fabric. Fabric shall be placed in slabs slightly above center on chairs.

3.3 All design, placement, laps ties, accessories, etc., shall conform to the latest applicable requirements of A.C.I. Code.

A. Fabricating and Placing Tolerances. Fabricate and place reinforcing to conform to tolerances set forth in Section 5.4 of ACI 301.

B. Reinforcing in walls and footings shall be continuous around corners.

C. All tension splices in hairpins and tie beam reinforcing shall be made by mechanical device. All other splices shall have rebar lapped 30 bar diameters or 18” minimum splices unless noted on plans otherwise.

D. Provide 3’-0” long #4 bars at slab corners, as noted on plans.

END OF SECTION

Section 03 31 00

CAST-IN-PLACE CONCRETE

PART ONE – GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to the General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 COOPERATION

This Contractor is cautioned to examine all drawings and specifications relating to other branches of the work, and he shall make proper provisions to receive all other work. No structural concrete shall be cut or broken out by any of the trades without written permission from the Architect.

1.3 SCOPE

Shall include all concrete work and related items required to complete the work indicated on the drawings and/or specified herein.

1.4 CHARACTER OF WORK

Concrete shall be structurally sound, dense, free of honeycombs, planes of weakness or other defects and built to exact lines, shapes and levels shown. Concrete not meeting requirements of this specification will be rejected, removed and replaced. Faulty work may be repaired in lieu of removal and replacement only if written approval is given by Architect. The Contractor shall perform all removal, replacement or repair work to the approval of Architect at no expense to Owner.

1.5 The requirements of "Specifications for Structural Concrete for Building" (ACI 301) are a part of these specifications; its provisions shall govern this work except as noted on these Plans and Specifications.

1.6 SUBMITTALS

Contractor shall submit one hard copy (not to be returned) and one electronic copy in PDF format as per Section 01 33 23 of all products to be used and all proposed concrete mixes in accordance to Section 03 31 00 subsection 2.5 for approval by the architect.

PART TWO – MATERIALS

2.1 STORAGE OF MATERIALS

Provide proper space and storage shelter for the storage of materials which may be subject to weather conditions and damage. All lumpy, dirty or damaged cement shall be rejected. All cement and aggregate shall be stored and cared for in such a manner as to avoid inclusion of foreign materials. Frozen or partially frozen aggregates shall not be used.

2.2 PORTLAND CEMENT

Shall conform to type I/II or type IA/IIA, according to ASTM C150, "Standard Specifications for Portland Cement"; or type IL, according to ASTM C595, "Standard Specifications for Blended Hydraulic Cements."

2.3 AGGREGATE FOR CONCRETE

Shall conform to ASTM "Standard Specifications for Concrete Aggregate" C-33, Latest Revision.

A. Fine aggregate shall be siliceous material and shall be clean, sharp, free from dust, silt, soft particles, vegetable loam, organic impurities, or other deleterious matter.

B. The maximum size of aggregate shall be no larger than one-fifth (1/5) of the narrowest dimension between sides of forms within which concrete is to be cast, nor larger than three-fourths (3/4) of the minimum clear spacing between reinforcing bars, or between reinforcing bars and forms. For unreinforced slabs, the maximum size of aggregate shall not be larger than one-third (1/3) the slab thickness.

C. Coarse aggregate shall consist of crushed stone, gravel or other approved inert materials with similar characteristics or combination thereof, having clean, hard durable, uncoated particles free from deleterious matter. After acceptance of a grading, a variation in the amount passing any sieve size of more than 10 percent of the total will not be permitted, and the grading shall be within the following by weight:

Normal Weight

Passing a 1-1/4" sieve……90 to 100 percent

Passing a 3/8" sieve ……...20 to 55 percent

Passing a No. 4 sieve ……..0 to 10 percent

Passing a No. 8 sieve ……...0 to 5 percent

Concrete Masonry Fill

Passing a 1/2 " sieve……..90 to 100 percent

Passing a 3/8 " sieve ……..40 to 70 percent

Passing a No. 4 sieve …….0 to 15 percent

Passing a No. 8 sieve …….0 to 5 percent

2.4 MIXING WATER

Shall be clean and free from all acid and injurious amounts of vegetable matter, alkalies, or other salts.

2.5 CONCRETE

A. The proportion of ingredients shall be selected to produce the proper placability, durability, strength, and other required properties. The proportion of ingredients shall be such as to produce a mixture which will work readily into corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting the materials to segregate or excessive free water to collect on the surface. Refer to the Concrete Placement Schedule on the drawings. Mix designs to be used shall meet the following criteria:

Mix design		Slump Ins.	Max. Water-Cement/Ratio*
4,000 psi – with Air-Entrainment		4	0.50
4,000 psi - no Air-Entrainment		4	0.50
3,000 psi - no Air-Entrainment		4	0.53
3,000 psi – Masonry Fill, no Air-Entrainment	**	8	0.53

Mix Design strength listed is the minimum ultimate strength at 28 days
*Water-Cement ratio = #Water/#Cement
** Concrete masonry fill may be mixed in the mason's mixers provided the dry materials are prepackaged and the mix is prepared according to manufacturer's instructions (SpecMix or equal)

B. Admixtures: No concrete additives other than air-entrainment, fly ash and water reducer shall be allowed without written permission of Architect.

1. Air-entraining Admixtures:
   a. Air-entraining admixtures shall conform to Specifications for Air-Entraining Admixtures for Concrete (ASTM C260).
   b. The air content of air-entrained concrete shall conform to requirements set forth in the following table:

Maximum Size Coarse Aggregate, Inches	Air Content Percent by Volume
1-1/2, 2 or 2-1/2	5 +/- 1
3/4 or 1-1/2	6 +/- 1
3/8 or ½	7-1/2 +/-1

2. Fly ash admixture is permitted only under the following conditions.
   a. The fly ash shall meet all of the requirements of ASTM C-618-80 Class C or Class F with the following requirements. The loss on ignition in Table 1 shall not exceed 3%. Compliance to Table 1A shall apply. The amount retained on the 325 sieve in Table 2 shall not exceed 20%. The chemical analysis of the fly ash shall be reported in accordance with ASTM C-114. Quality assurance testing and reports for a minimum of six months hall be submitted by the fly ash supplier. Supplier must be approved by Architect prior to preparing mix design.

b. Concrete containing fly ash shall NOT be used in exposed slabs.
c. Concrete containing fly ash shall NOT be placed when anticipated ambient temperature will be less than 60 degrees F. when concrete is placed and for 24 hours after placement.
d. Agent shall submit, and obtain approval for, a concrete mix design without fly ash for each design with fly ash. This concrete mix design without fly ash is to be used when temperature falls below 60 degrees F.
e. Fly ash content shall be no more than 20% of the content of cement (measure by weight).
f. Agent must submit a record of 30 consecutive concrete tests using the mix design with fly ash as per ACI-318, Sec. 5.3.

3. Water Reducer: Shall conform to ASTM (C-494).
4. Contractor is responsible for admixture compatibility in order to produce concrete described in Sub-section 2.5.1 above.

C. The Contractor shall submit, through an approved independent testing laboratory, the proposed concrete mixes to be used prior to placing any concrete on the project. Concrete proportions for these mixes, including water-cement ratio, shall be established with materials to be employed on the basis of:

1. Field experience as per ACI-318, Sec.5.3
2. Where a production facility does not have 30 consecutive tests meeting the requirements of ACI-318, Sec. 5.3, trial batches shall be made. The proposed concrete mixes must be approved by preliminary cylinder tests. These proving tests shall consist of at least 4 cylinders for each specific mix. Control test cylinders shall be made and stored in accordance with ASTM C-31. The average compressive strength of these cylinders shall be 1200 psi greater than the Ult. Strength at 28 days (fc'). This procedure is NOT TO BE USED FOR CONCRETE WITH FLY ASH.
3. The owner shall pay for all design mixes and cylinder tests.

D. Concrete shall be transit-mixed concrete and conform to Mixing and Transportation portion of the ASTM "Standard Specification for Ready-Mixed Concrete", C-94. The time from introduction of water to discharge shall not be more than 45 minutes. The concrete producer shall furnish duplicate delivery tickets with each load of concrete delivered to the project, listing all ingredients and amount of ingredients in the mix, slump and time of introduction of water.

2.6 CURING COMPOUND

A. 1100-Clear as manufactured by W.R. Meadows shall be used on all interior and exterior concrete slabs unless noted on plans or as noted below. Curing compound shall not be applied to slabs to receive floor hardener.

B. For floors to receive floor hardener, cure floors as per manufacturer's recommendations.

PART THREE- EXECUTION

3.1 INSTALLATION

A. Depositing Concrete

1. Place no concrete until reinforcing steel, pipes, conduits, sleeves, hangers, anchors, waterproofing and other work required to be built into the concrete has been inspected and approved by the Architect.
2. Remove water and foreign matter from forms and excavations. Unless otherwise directed, thoroughly wet wood forms, sand and earth just prior to placing concrete on them. Compact soil under slabs on ground to firm unyielding surface. Place no concrete for foundations on disturbed footing.
3. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling. Deposit no partially hardened concrete. Concrete shall be compacted by mechanical vibration. Care shall be exercised so that concrete shall not be over-vibrated to the extent that segregation of the aggregate will occur.
4. Cold Weather Requirement. When air temperature is 40 degrees F. or below, concrete temperature shall be 60 and 90 degrees F. when placed and shall be maintained at not less than 50 degrees F., for at least 72 hours. Pour no concrete on frozen soil. Cold weather concreting shall be performed according to ACI-306, “Cold Weather Concreting”.
5. Hot Weather Concreting. When the temperature rises above 95 degrees F. at any time during the day, the Contractor shall place no concrete without permission of the Architect. When weather conditions warrant, and/or the Architect requires, concrete placement shall cease to be performed according to ACI-305, “Hot Weather Concreting”.
6. No water shall be added at the construction site without the permission of the Architect.
7. Conveying of the concrete directly over the steel reinforcement will not be allowed. Raised runways above the top of such reinforcement as well as the top of finished slab shall be required in all places where wheeled conveyers are used.
8. All trench ducts, floor drains, J-boxes, cleanouts, etc., installed in floor slab, shall be preset in required location at correct elevation prior to final concrete pour.
9. All trades with equipment in concrete slab shall be present during pour.

B. Screeds. Use temporary pipe screeds as required. Use 1-1/4” o.c. black pipe on adjustable chairs at 48” o.c. Wet screeds are not acceptable on slabs on grade. Wood stakes under pipe screeds are not acceptable.

C. Curing and Protection

1. Protect all concrete work and cement finishes against injury from the elements and defacement of any nature during construction operations. Floors shall be protected from face damage, both defacement and chemical.
2. Vertical surfaces of walls and foundations shall be kept formed or wet for a period of seven days after pouring.

3. Unless otherwise specified, curing compound shall be applied to all interior concrete slabs, steps, etc., to meet manufacturer's specifications. Curing compound shall be applied evenly and uniformly when the surface is damp but not wet and can no longer be marred by walking workman.
4. On slabs to receive special floor finishes the slabs shall be moisture cured by one of the following methods for a minimum of 7 days.
   a. Applying a minimum of 1- 1/2" of clean sand over the freshly placed concrete slab. Sand shall be kept wet for 7 days.
   b. Application of absorptive mats of fabric kept continuously wet.
5. Curing compound shall be applied to all exterior concrete slabs, steps, curbs, etc., to meet manufacture's specifications. Apply at a rate of 200 sq. ft. per gallon. Curing compound shall be applied evenly and uniformly when the surface is damp but not wet and can no longer be marred by walking workmen.

3.2 TESTING

A. General
All materials and equipment used in construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be approved by Architect prior to starting concrete operations. At Contractor's expense, a certified ACI technician shall take test cylinders at the job site. The owner shall pay for all other services of the testing agency described in this section unless noted otherwise.

B. Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.

C. Testing Services

1. The designated testing agency shall:
   a. Review Contractor's proposed mix design and materials.
   b. If the proposed mix design meets the quantities and requirements of the specification, the agency shall check test the Contractor's proposed mix design.
   c. Test the Contractor's proposed materials for compliance with the specifications if deemed necessary and with the approval of the Architect.
   d. Secure production samples of materials at plants or stockpiles during the course of work and test for compliance with specifications if deemed necessary and with approval of the Architect.
   e. Conduct strength tests of the concrete in accordance with following procedures:
      (1) Cure specimens from each sample in accordance with "Method of Making and Curing Concrete Compression and Flexure Specimens in the Field" (ASTM C31).
      (2) Test on specimen at 7 days in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39). The 7-day test shall be at least 60% of the 28-day design strength.

(3) Test one specimen at 14 days in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39).
The 14-day test results shall be at least 80% of the 28-day design strength.

(4) Test 3 specimens at 28 days in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39).
The 28-day test result shall be average of strengths of the 3 specimens.

(5) Make one strength test for each 100 cu. yds. Or fraction thereof for any class of concrete placed in any one day, except that in no case shall a given class be represented by less than five (5) tests. Except for reinforced masonry columns, grade beams, and floor slabs, concrete pours of less than ten yards need not be tested.

f. Report all test results to Architect's Field Representative and Contractor on same day that tests are made.

2. The testing agency may also perform the following additional services if Architect's Field Representative desires, the cost of which will be borne by the Contractor if the methods or the materials fail to meet the above specs.

a. Check batching and mixing operations to the extent deemed necessary by Architect's Field Representative.

b. Review the manufacturer's reports of each shipment of cement and reinforcing steel and/or conduct laboratory tests or spot checks of these materials as received.

c. If average compressive strength of the three 28-day specimens, from a given sample, does not meet the above specifications, the in-place hardened concrete shall be tested. These in-place concrete tests shall be determined by the Architect and shall consist of testing of drilled cores or impact hammer or both. The number of tests and locations shall be determined by the Architect. The drilled cores shall be taken in accordance with "Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete". (ASTM C42). These additional tests will be paid for by the contractor.

D. Authority and Duties of Testing Agency

1. Technicians representing the testing agency shall inspect the materials and the manufacture of concrete and shall report their findings to Architect's Field Representative and the Contractor. When it appears that the material furnished or work performed by the Contractor fails to fulfill specification requirements, the technicians shall direct the attention of the Architect's Field Representative and the Contractor to such failure.

2. The technicians shall not perform other duties for Contractor unless the services are paid for by the Contractor.

3. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate Architect's Field Representative to final acceptance.

4. Technicians are not authorized to revoke, alter, relax, enlarge or release any requirements of the specifications, not to approve or accept any portion of work.

E. Responsibilities and Duties of Contractor

1. The use of testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the plans and specifications.
2. To facilitate testing services, the Contractor shall:
   a. Prior to concrete operations, provide both the testing agency and concrete supplier with a copy of Section 03 31 00 of the specification.
   b. Secure and deliver to Architect or his testing agency without cost, preliminary representative samples of the materials he proposes to use, and which are required to be tested.
   c. Submit through testing agency to Architect the Concrete Mix Design he proposes to use, and make written request for approval.
   d. During concreting operations at site, provide testing agency with strength test samples according to the following procedures:
      (1) Secure concrete samples from batch in accordance with "Method of Sampling Fresh Concrete" (ASTM C172). Note one strength test or sample will include 5 specimens or 5 test cylinders.
      (2) Mold 5 specimens from each sample in accordance with "Method of Making and Curing Concrete Compression and Flexure Specimens in the Field" (ASTM C31), and cure under Standard Moisture and Temperature Conditions in accordance with Sections 7.1, 7.2, and 7.3 of ASTM C31.
      (3) Make one strength test for each 100 cu. yds. or fraction thereof for any class of concrete placed in any one day, except that in no case shall a given class be represented by less than five (5) tests. Except for reinforced masonry columns, grade beams, and floor slabs, concrete pours of less than ten yards need not be tested.
   e. Furnish such casual labor as is necessary to obtain and handle samples at the project or at other sources of material.
   f. Advise the testing agency sufficiently in advance of operations to allow for completion of quality tests and for assignments of personnel.
   g. Provide and maintain adequate facilities for safe storage and proper curing of concrete test cylinders on the project site for the first 24 hours as required by ASTM C31.
   h. Deliver test specimens to laboratory for testing as per ASTM C31. Specimens shall be protected from physical damage, including freezing and drying, during shipping.
   i. Furnish copies of mill test report of all shipments of cement to Architect and testing agency if required.

F. Evaluation of Test Results

1. Test results shall be evaluated separately for each specified strength.
2. If the number of tests conducted is less than outlined on Paragraph 3.2.4.2, the Architect has the option to reject the untested concrete or require in-place concrete test. The cost associated with either option will be paid by the contractor.
3. Test results obtained by use of an impact hammer or sonoscope, unless correlated with other test data, shall not be considered conclusive in evaluating strengths of concrete.

4. Evaluation shall be valid only if tests have been conducted in accordance with procedures specified herein.

3.3 CLEANING

Clean all exposed surfaces and adjoining work stains by leakage of concrete, and point all exposed joints in concrete work to the approval of the Architects.

3.4 CODE REQUIREMENTS

All work, including forms, reinforcing, placing, laps, ties, etc. as well as the aggregate, design, mix, transportation, placing, finishing, curing, protection, etc., as all concrete work, shall conform to the latest published code and recommendations of the American Concrete Institute, which are hereby made a part of this specification as if here copied in their entirety.

END OF SECTION

Section 03 35 00

CONCRETE FINISHES

PART ONE - GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to the General Conditions and Supplementary General conditions and shall be governed by the requirements therein.

1.2 COOPERATION

This Contractor is cautioned to examine all drawings and specifications relating other branches of the work, and he shall make proper provisions to receive all other work.

1.3 SCOPE

Shall include all labor and materials required to complete the work indicated on the drawings and/or specified herein.

1.4 QUALITY ASSURANCE

A. Concrete flatwork shall be performed utilizing high quality techniques conforming to American Concrete Institute Standards provided for by ACI Publication CP-10, Concrete Flatwork Technician and Flatwork Finisher, ACI Publication CCS-1, Concrete Craftsman Series Slabs on Grade.

B. All concrete installation shall be performed by at least one ACI Flatwork Finisher or Technician currently certified with ACI.

C. All projects greater than 10,000 square feet will require at least two ACI Flatwork Finishers or Technicians currently certified with ACI.

1.5 SUBMITTALS

A. Provide ACI certification documentation for all finishers who will be installing concrete prior to starting any concrete operations.

B. Contractor shall submit one hard copy (not to be returned) and one electronic copy in PDF format as per Section 01 33 23 of concrete products to be used for approval by the architect.

1.6 PRE-WORK CONFERENCE

Within two weeks prior to the placement of any finished concrete, a pre-work conference shall be held at the job site with the following in attendance: Architect's Representative, Contractor's Job Superintendent, finishing sub-contractor, and all sub-contractors applying floor coverings and/or special floor finishes. This meeting will serve the following purposes: To discuss plans and specifications and clarify any questions pertaining to concrete finishes and floor coverings, and to transfer ideas as to what the Architect will expect from all trades and ideas that the sub-contractors may have on their portion of the job.

PART TWO - MATERIALS

2.1 FLOOR HARDENER

A. Verify areas to receive hardener with the Finish Schedule on drawings.

B. Material: Liqui-Hard Ultra as manufactured by W.R. Meadows

C. Application: One coat flushed on floor in accordance with manufacturer's printed instructions.

2.1 FLOOR SEALER

A. Verify areas to be Sealed Concrete with the Finish Schedule on drawings.

B. Material: MasterKure CC 180WB (formerly "Kure-N-Seal"), as manufactured by BASF or equal.

C. Application: Within one week of substantial completion, apply two coats of sealer in accordance with the manufacturer's printed instructions at a rate of 400 SF/gal.

PART THREE - EXECUTION

3.1 FINISHING CONCRETE

A. Immediately after removing forms, all concrete surfaces shall be inspected and any poor joints, voids, or stone pocket surfaces and other defective areas shall be patched and placed in good condition.

B. All exposed surfaces of foundation walls, retaining wall, interior walls and edges of turned down slabs shall be formed on plywood with a smooth finish. Rub as necessary to remove fins and projections. Fill all voids to leave surface smooth.

C. Concrete with applied coating shall be formed on plywood. Rub as necessary to remove fins and projections. Fill all voids to leave surface smooth and acceptable to receive applied coating.

D. Floor Flatness and levelness of interior slabs: The finished concrete surface shall have a minimum value as specified below measured in accordance to ASTM E 1155. Grind down any surface defects that would telegraph through applied floor covering. Use a "Dipstick" or other approved method for measurement of floor flatness and levelness. Contractor to provide written report to the Architect within 48 hours of completion of each pour.

Surface Areas	Floor Flatness Local F_f	Floor Levelness Local F_L
All slab on grade areas	30	25

E. Exterior steps, porches, walls, etc., shall be smoothed with a steel trowel, followed by a brushed finish for non-slip surface. Steps shall have edges rounded with a steel edging tool.

F. All exterior concrete slabs shall be sloped to provide water drainage. Any exterior concrete that holds water puddles shall be removed and replaced by the Contractor at his expense.

3.2 SURFACE DEFECTS

Surface defects which do not impair the structural strength shall be carefully cut out and refilled with fresh concrete. Cuts shall not be less than one inch (1") deep and thoroughly wetted just prior to filling with concrete of stiff consistency and mixed approximately the same as the adjoining work. After partial set, compress and rub to produce a finish similar in texture and color to adjoining work.

END OF SECTION

Section 05 12 00

STRUCTURAL STEEL

PART ONE - GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to the General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 SCOPE

This section shall include the furnishing and erection of all structural steel. No structural steel members shall be cut or altered by any of the trades, without written permission from the Architect.

1.3 DISCRETIONARY STEEL ALLOWANCE

This contractor shall provide a cash allowance of $5,000 for fabrication, re-fabrication and erection of steel. This is to be used at the discretion of the Architect and only with the Architect's written approval. This steel is not for Miscellaneous or Structural Steel detailed on plans. If any portion of this allowance is not used, the cost of which will be refunded to the Owner.

1.4 VERIFY DIMENSIONS

General Contractor shall field verify existing dimensions prior to fabrication of structural steel.

1.5 SHOP DRAWINGS

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 and checked shop drawings for approval by the Architect. All drawings shall clearly show location and sizes of all material, all building dimensions and elevations pertinent to the structure, and any other miscellaneous technical and erection data required for approval and construction. These shop drawings must be approved by the Architect before fabrication and shipment. PARTIAL SUBMITTALS WILL NOT BE ACCEPTED UNLESS APPROVED IN ADVANCE WITH THE ARCHITECT.

PART TWO - MATERIALS

2.1 STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING:

A. Wide flange shapes and WT sections: High-Strength, Low-alloy, Columbium-Vanadium Steels of Structural Quality, ASTM A 992 Fy=50 ksi.

B. Angles, round bars, and channels: Specifications for Structural Steel, ASTM A36, Fy=36 ksi.

C. Plates less than ½" thick: ASTM A36, Fy=36 ksi.

D. Bars and Plates ½" Thick and Greater: ASTM A-572, Fy=50 ksi.

E. Steel pipe: Specification for Electric Resistance Welded Pipe ASTM A53, Grade B (Fy=35 ksi) or Specification for Hot-Formed Welded Seamless Carbon Steel Structural Tubing, ASTM A501 (Fy = 36ksi).

F. Steel tubing: Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes ASTM A500 Grade C (Fy = 50 ksi).

2.2 FASTENERS SHALL CONFORM TO THE FOLLOWING:

A. Arc-welding electrodes: American Welding Society "Specifications for Iron and Steel Arc-Welding Electrodes", latest addition, Type E70XX

B. Bolts

1. Bolts for wood blocking: Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, ASTM A307.
2. Bolts for main structural connections or bolts not otherwise specified:
   a. Specification for High Strength Bolts for Structural Steel Joints Including Suitable Nuts and Plain Hardened Washers, ASTM A325 Type N. Include suitable nuts and plain hardened washers, or
   b. Standard Specification Twist Off Type Tension Control Structural Bolt/Nut/Washer Assembly ASTM F-1852-08. 120/105 Min. tensile strength.
3. Anchor Bolts: ASTM A307. Minimum washer size & thickness per Table 14-2 of the Fourteenth Edition of the AISC Manual.

C. Sleeve Anchors in Masonry: Federal Specifications A-A-1922A.

D. Expansion Anchors in Concrete and Grouted CMU:

1. In concrete: ICC-ES AC193. Acceptable anchors are Hilti KWIK Bolt-TZ2 (ICC-ESR-4266), Simpson Strong-Bolt 2 (ICC-ES ESR-3037), Powers Power-Stud+SD2 (ICC-ES-ESR 2502), or Powers Power Stud+SD1 (ICC-ES-ESR 2818)
2. In Solid Grouted Concrete Masonry Units: ICC-ES AC01. Acceptable anchors are Hilti KWIK Bolt 1 (IAPMO ER-677), Simpson Strong-Bolt 2 (IAPMO-ES ER240), or Dewalt Power – Stud+SD1(ICC-ES-ESR 2966)

E. Screw Anchors in Concrete, Grouted CMU, and Hollow CMU:

1. In concrete: ICC-ES AC193. Acceptable anchors are Hilti KWIK HUS-EZ and KWIK HUS-EZ I (ICC-ESR-3027), Hilti KWIK-X Dual Action Anchor (ICC-ESR-5065), Simpson Titen HD and Titen HD Rod hanger (ICC-ESR-2713), or DEWALT SCREW BOLT+ (ICC-ES-ESR 3889)
2. In Solid Grouted Concrete masonry Units: ICC-ES AC106. Acceptable anchors are Hilti KWIK HUS-EZ (ICC-ESR-3056), Simpson Titen HD (ICC-ESR-1056), or DEWALT SCREW BOLT+ (ICC-ES-ESR 4042)
3. In Hollow Concrete Masonry Units: Acceptable anchors are Hilti KWIK-CON+ or Simpson Titen HD (ICC ES-ESR-1056).

F. Adhesive Anchors:

1. In Unreinforced Masonry Units: ICC-ES AC60. Acceptable adhesives are Hilti HIT-HY 270 (ICC-ESR-4144), Simpson ET-HP (ICC-ES ESR-3638), Simpson AT (ICC-ES ESR-1958), or DEWALT AC100+GOLD (ICC-ES-4105). Steel anchor element shall be Hilti HAS-V-36 or ASTM F1554 Grade 36 continuously threaded rod.
2. In Concrete Masonry Units: ICC-ES AC58. Acceptable adhesives are Hilti HIT-HY 270 (ICC-ESR-4143), Simpson SET-XP (IAPMO UES-ER 265), Simpson AT-XP (IAPMO UES-ER 281), DEWALT AC100+GOLD (ICC-ES-ESR 3200), or approved equal. For unreinforced masonry units, use Plastic Mesh Screen Tube per Manufacturer recommendations. Steel anchor element shall be Hilti HAS-V-36, ASTM F1554 Grade 36, or ASTM A193, Grade B6, B8, or B8M continuously threaded rod.
3. In concrete: ICC-ES AC308. Acceptable anchors are Hilti HIT-HY 200 V3 fast cure (ICC-ESR-4868), Hilti HIT-RE 500 V3 slow cure (ICC-ESR-3814), Simpson SET-3G (ICC-ESR-4057), Simpson AT-XP (IAPMO UES-ER263), DEWALT Pure 220+, EPOXY SYSTEM Standard Cure – (ICC-ES-ESR 5144), DEWALT AC 200+, ACRYLIC SYSTEM fast cure – ICC-ES ESR 4027) (Use with DEWALT Dust X system with Hollow drill bit for OSHA compliance), or approved equal. Steel anchor element shall be Hilti HAS-V-36, ASTM F1554 Grade 36, or ASTM A193, Grade B6, B8, or B8M continuously threaded rod. Store all anchoring products in strict accordance with manufacturer's recommendations.

G. Undercut Anchors:

1. In Concrete: ICC-ES AC193. Acceptable anchors are Hilti HDA (ICC-ESR-1546), Simpson Torq-cut (ICC-ESR-2705), or DEWALT CCU+ Undercut anchor (ICC-ES-ESR 4810).

2.3 CONNECTOR SHALL CONFORM TO THE FOLLOWING:

A. Headed Stud Shear Connectors: ASTM A108, Fy=51ksi, Fu=65 ksi minimum ultimate tensile strength. Studs shall be solid fluxed attached with appropriate stud gun capable of meeting the strengths set forth in Table 1.11.4 AISC Specification.

B. Headed Concrete Anchors: ASTM A108, Fy=49 ksi, Fu=65ksi minimum ultimate tensile strength.

C. Threaded Studs: ASTM A108, Fy=49ksi, Fu=61 ksi minimum ultimate tensile strength.

2.4 MECHANICAL EQUIPMENT FRAMES

All mechanical equipment frames or miscellaneous steel required to complete the mechanical equipment installation shall be provided and detailed by the structural steel fabricator. The mechanical equipment contractor shall provide all necessary weights and dimensions to the structural steel fabricator. Shop drawings for mechanical and equipment frames must be submitted and accepted by the Architect.

2.5 FABRICATION

A. Workmanship and fabrication shall be in accordance with AISC "Specification, Design, Fabrication and Erection of Structural Steel for Buildings" and with the following outline.

B. Welding shall be in accordance with the "Standard Code for Arc Welding in Building Construction" of the American Welding Society.

C. All structural steel shall be kept free of mud and dirt. Any dirty or muddy steel shall be washed clean.

D. Bearing surfaces shall be planed to true beds. Abutting surfaces shall be closely fitted.

E. All columns and bearing stiffeners shall be milled to give full bearing over the cross section. Column base plates 2” or less in thickness may be used without planing. It will not be necessary to plane bottom surfaces of plates or grout beds.

F. There shall be no splices (shop or field, bolted or welded) along structural steel members other than at locations shown on plans.

G. This Contractor shall be responsible for design and fabrication of all "simple framed" member connections unless detailed on plans. "Rigid framed" connections shall be fabricated as detailed on plans. Design and fabrication of connections shall meet the requirements of AISC Specifications.

H. Bolted connections shall meet AISC Specification for Structural Joints using ASTM A325 Type N; UNO on plans.

I. Fascia girders and other steel requiring accurate alignment shall be provided with slotted holes and/or washers for aligning the steel accurately.

2.6 PAINTING

A. Deliver paint to shop and job in original sealed containers clearly marked with the manufacturer's name and identifying brand number or name. Use paint as prepared by the manufacturer without thinning or other admixture.

B. All structural steel shall be shop painted as follows:

1. Apply one coat of standard oxide primer (DFT = 3mil) to all surfaces of steel work.
2. Do not apply shop paint within 2" of surfaces to be field welded.
3. Do not apply shop paint to steel to be fire-proofed.
4. Exposed steel shall not have piece marks applied with bleed through type markers.

PART THREE - EXECUTION

3.1 ERECTION

A. Erection shall include the setting of all columns and bases and erection of all structural steel as called for under the contract for furnishing and delivery of structural steel, but shall not include the setting of loose lintels (to be set by mason).

B. Set column bases and beam plates 12” x 12” and larger to accurate elevations approximately 1” clear of masonry on steel wedges and/or bolts as indicated on drawings. These will be grouted by the mason who will also set small beam plates. Wooden wedges shall not be used. Set anchor bolts to be concreted in by the mason.

C. See the drawings and general notes for field connections.

D. Field errors shall not be corrected by burning except with the permission of the Architect.

E. Brace and guy all structural members until all connections are made.

F. After erection, touch up all injuries to priming coat and all others where field welding is done. Bolt heads and nuts shall be touched up in field. Use same material as specified for shop coat.

3.2 WELDING

A. Welding in shop and field shall be done by operators who have been previously qualified by tests as prescribed in the American Welding Society, "Standard Qualification Procedure." All operators must have successfully passed the welding qualification tests within a 24-month period preceding erection. The Architect shall be provided a copy of the welding qualification test for each operator at no additional cost to the Owner.

B. Equipment to be of a type which will produce proper current so that operator may produce satisfactory welds. Welding machine shall be of 200-400 ampere, 25-40 volt capacity.

C. Electrodes shall be suitable for positions and other conditions of intended use in accordance with the instructions with each container.

D. Field welding shall be done by direct current.

E. Technique of welding employed, the appearance and quality of welds made and methods of correcting defective work shall conform to American Welding Society "Code for Arc Welding in Building Construction", Section 4, "Workmanship".

F. Surfaces to be welded shall be free from loose scale, rust, grease, paint and other foreign material except that mill scale withstanding vigorous wire brushing may remain. A light film of linseed oil may likewise be disregarded. Joint surfaces shall be free from fins and tears.

G. No welding shall be performed when temperature of the base metal is lower than 0 degrees F. At temperatures between 32 degrees F. and 0 degrees F., the surfaces of all areas within 3” of a point where a weld is started shall be heated until they are too hot to touch before welding is started.

H. Finished members shall be true to line and free from twists, bends, and open joints.

3.3 TESTS

A. Laboratory tests. Methods of testing shall be according to the following:

STRUCTURAL STEEL – ASTM A-36, ASTM A992 or ASTM A572. Two tension tests from each melt. Two bend tests from each melt.

STEEL ELECTRODES – ASTM A-223, As directed.

B. Field Tests. All field and shop welders shall be tested and certified by an approved testing laboratory. The American Welding Society Operator Qualification test shall be used as a basis of qualification.

All field and shop operators shall qualify for the following:

Type of Weld	Position of Welding
Groove	Horizontal
Groove	Vertical
Groove	Overhead
Fillet	Vertical
Fillet	Overhead

C. The Architect's Representative may require strap cuts from welds in any supporting member to withstand nick-break test. If strap fails to meet requirements, Contractor shall replace strap cut from member at no charge to Owner. If strap does meet requirements, the Architect shall pay expenses of having metal replaced. In event strap fails, the welder shall be discharged.

3.4 OBSERVATION

The work shall be observed in the shop and the field. The Contractor shall give proper notice and allow full facilities for this observation. Notify Architect 48 hours prior to shipping structural steel.

END OF SECTION

Section 05 41 00

LIGHTGAGE METAL FRAMING

PART ONE - GENERAL

1.1 SCOPE

All axial or wind loaded light gage steel studs, track, joists, bridging and related accessories are as indicated on the Contract Drawings and specified herein.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

Structural Steel: Section 05 12 00
Gypsum Wallboard: Section 09 21 00

1.3 QUALITY ASSURANCE

A. 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.

B. Inspection and Quality Control;

1. Contractor shall provide effective full time quality control over all fabrication and erection activities.
2. As directed by Architect, owner's testing agency may inspect the maintenance of a quality control program including spot checking weldments and welding procedures in accordance with A.W.S. standards.
3. Inspection responsibility for quality control shall remain with contractor.

C. Standards

1. Work shall meet the requirements of the following standards.
   a. American Iron and Steel Institute (A.I.S.I.) "Design of Cold Formed Steel Structural Members," 1986 with 1989 amendments.
   b. American Welding Society (A.W.S.) D.1.3, 1981 "Structural Welding Code-Sheet Steel".
   c. American Society for Testing and Materials (A.S.T.M.)
   d. American Institute of Steel Construction (A.I.S.C.) "Manual of Steel Construction," 9th edition.
   e. 2012 International Building Code with Arkansas Amendments.
2. The most stringent requirements shall govern in conflicts between specified codes and standards.

1.4 SUBMITTALS General: Submit one hard copy (not to be returned) and one electronic copy in PDF format as per Section 01 33 23 of fabrication and erection shop drawings and product data to the architect for approval.

A. Product Data: Submit copy of installation instructions for each item of lightgage framing and accessories.

B. Shop Drawings: Drawings shall show framing member indicating size and gage designations, number, type, location and spacing. Indicate supplemental bracing, accessories, and details as may be required for proper installation.

1.5 PRODUCT DELIVERY AND STORAGE

A. Protect metal framing units from rusting and damage. Deliver to the project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, location and spacing. Indicate supplemental bracing, accessories, and details as may be required for proper installation.

PART TWO - PRODUCTS

2.1 MANUFACTURERS: Clark Dietrich Building Systems, Marino, or approved equal.

2.2 METAL FRAMING

A. Systems Components: With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as indicated and as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.

B. Material and Finishes

1. All galvanized studs and joists shall be formed from steel that corresponds to the minimum requirements of 1986 A.I.S.I. standards with 1989 amendments.
2. All galvanized studs, joists, track, bridging and accessories shall be formed from steel having a galvanized coating meeting the requirements of ASTM A653.
3. Structural studs, joists, track, shall be color coded for appropriate material thickness. A sign shall be posted adjacent to material stockpile clearly depicting which color corresponds to the material thickness. All studs, joists, track, etc. shall be stamped by manufacturer with size.
4. Lightgage framing materials 54 mil. (16 gage) and thicker shall have a yield stress Fy=50 ksi. All lightgage framing materials 43 mil. (18 gage) and lighter shall have a yield stress Fy=33 ksi.
5. Minimum stud size for exterior walls, 600S162 43 mil.
6. Track sizes gage to match stud sizes and gage.
7. Structural lightgage members shown on drawings are called out based on industry standard nomenclature.
8. Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.
9. Electrodes for welding: Comply with AWS Code and as recommended by stud manufacturer.

10. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

C. Vertically adjusting tracks connecting studs to structural steel or deck are “Verti Track” by The Steel Network, Inc. 3221 Wellington Ct., Raleigh, NC or approved equal.

2.3 FABRICATION

A. General

1. Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion in any members in the assembly.
2. Fabricate units in jig templates to hold members in proper alignment and position and to assure consistent component placement.
3. Splices in axially loaded studs shall not be permitted.

B. Fastenings

1. Attach similar components by self-drilling screws or welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with the manufacturer.
2. Wire taping of framing components is not permitted.
3. Welds shall be performed by operators qualified in accordance with Section 6.0 of the American Welding Society’s “Structural Welding Code-Sheet Metal” (AWS D1.3-81). All welds shall be touched up with zinc rich paint.

C. Fabrication Tolerances

1. Fabricate units to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8" in 10'.
2. Axially loaded studs shall have full bearing inside track web (1/16" max. gap), prior to stud and track attachment. Studs shall be ordered long and cut in the field. Stud lengths are to be determined using laser equipment.

PART THREE - EXECUTION

3.1 INSTALLATION: Install metal framing systems in accordance with manufacturers printed or written instructions and recommendations, and final shop drawings.

A. Runner tracks: Install continuous tracks sized to match studs. Align tracks accurately to the layout at base and top of studs. Secure tracks as recommended by the stud manufacturer for the type of construction involved, except do not exceed 16" o.c. spacing for nail or power-driven fasteners, nor 12" o.c. for the other types of attachment. Provide fasteners at corners and ends of tracks.

B. Fasteners: (Unless noted otherwise on drawings).

1. Light gage metal to light gage metal: Kwik-Pro Self Drilling by Hilti. No 8-18 PPH for 18 gage metal. No. 10-16 PPH for 16 gage, 14 gage and 12 gage. Minimum of two screws per connection.

2. Light gage metal to steel. Kwik-Pro Self Drilling by Hilti. No. 12-24 HWH. Drill through light gage into steel, 16" o.c. maximum spacing.
3. Light gage to Concrete: DX Powder Actuated Fastener by Hilti. DX Fastener X-DNI Domed Head Nail .145 inch and minimum penetration of 1 1/8 inch. 16" o.c. maximum spacing.
4. Wood to light gage: Minimum of No. 8x1 inch bugle head screws.

C. WALL STUDS: Space studs 16" o.c. unless noted otherwise on drawings.

1. Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.
2. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements. Provide minimum of 10" from end of stud to start of first punchcut at top and bottom.
3. Where stud system abuts structural columns or walls, anchor ends or stiffeners to supporting structure.
4. Install supplementary framing, blocking and bracing in the metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the items supported.
5. Frame wall openings larger than 2' square with double stud at each jamb of frame except where more than two are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure studs system wall opening frame in manner indicated.
6. Frame both sides of expansion and control joints, as shown for the wall system, with a separate stud; do not bridge the joint with components of the stud system.
7. Install horizontal bridging of 54 mil. "U" channel in stud system, spaced (vertical distance) at not more than 4 ft o.c.
8. Temporary bracing shall be provided until erection is completed.
9. Provide stud walls at locations indicated on plans as "shear walls" for frame stability and lateral load resistance.

D. HEADERS: Locate in elevation and horizontal spacing as shown on plans.

1. Punchouts in webs of headers shall be placed a minimum of 10" clear from the face of the supporting wall.
2. Provide blocking and strapping per drawing.

E. ERECTION TOLERANCES:

1. Bolt or weld wall panels (at both horizontal and vertical junctures) to produce flush, even, true-to-line joints.
2. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/16".

3.2 FIELD PAINTING: Touch-up shop-applied protective coating damaged during handling and installation. Use galvanizing repair paint for galvanized surfaces.

END OF SECTION

Section 05 50 00

METAL FABRICATIONS

PART ONE - GENERAL

1.1 SCOPE

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

a. Steel supports for work of other trades.
b. Miscellaneous metal steel attachments, anchors, plates, angles, etc.
c. 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

Cast-in-Place 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:

a. 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.
b. 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.
c. Remove oil, grease and similar contaminants in accordance with SSPC SP-1.
d. 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 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.

2.3.2 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.

3.3 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

Section 05 51 33

METAL LADDERS

PART ONE – GENERAL

1.1 DESCRIPTION

A. Work included: Provide metal ladders as shown on the drawings, specified herein, and needed for a complete and proper installation.

1.2 REFERENCES

A. AA – Aluminum Association

B. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C. ASTM B 221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

D. OSHA 1910.27 – Fixed Ladders

1.3 QUALITY ASSURANCE

A. 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.

B. 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.

1.4 SUBMITTALS

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

B. Manufacturer's data: Within 30 calendar days after award of Contract, submit:

1. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
2. Complete shop drawings.
3. Provide templates for anchors and bolts specified for installation under other Sections.
4. Provide reaction loads for each hanger and bracket.
5. Manufacturer's recommended installation procedures.

1.5 PRODUCT HANDLING

A. 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.

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.

C. 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 manufacturers' recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 GENERAL

A. Ladder shall be a Model 502 tubular rail low parapet access ladder with roofover rail extensions as manufactured by O'Keeffe's Inc., San Francisco, CA or Architect approved equal.

B. Finish to be mill finish.

C. Other Materials: All other materials, including but not necessarily limited to anchorage devices, end caps, isolation bearings, etc., shall be only as recommended by the manufacturer, and as approved by the Architect.

PART THREE – EXECUTION

3.1 INSPECTION

A. 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.

END OF SECTION

Section 06 06 00

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:

Item:	Description:
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

Section 06 10 00

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 BLOCKING

3.4.1 Blocking:

3.4.1.1 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.

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

3.5 INSTALLATION OF PLYWOOD

3.5.1 Placement:

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

3.5.1.2 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.

3.5.2 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.

3.6 FASTENING

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

3.6.2 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.

3.6.3 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.

3.7 CLEANING UP

3.7.1 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.

3.7.2 Sweeping:

3.7.2.1 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.

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

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

END OF SECTION

Section 06 20 00

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 l3" 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 throught 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

Section 06 22 00

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
2. Shelf & brackets

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 plastic laminate surfacing, covered metal trim and solid surfacing.

1.4.3 Submit millwork hardware schedule.

1.4.4 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. Provide birch finish trim at all cabinets, lockers, etc.

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 EXTERIOR GRADE PLYWOOD

2.4.1 Concealed use and where otherwise called for DFPA Exterior C-C grade fir plywood.

2.4.2 One face exposed DFPA Exterior A-C grade birch plywood.

2.4.3 All plywood: Conform to Product Standard PS-1 of the U.S. Department of Commerce.

2.4.4 Backing for plastic laminate surfacing: DFPA Exterior Grade C-C.

2.5 PLASTIC LAMINATE SURFACING

High pressure laminated plastic sheets, 0.048 inch thick.

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 SOLID POLYMER MATERIAL:

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

2.6.1 Product: Solid surfacing as manufactured by Wilsonart or Architect approved substitute. Color and finish selected by Architect from Price Group 1 through 3.

2.6.2 Adhesive: as recommended by manufacturer for substrate indicated.

2.7 PRESSURE TREATED WOOD:

In accordance with Section 06 06 00.

2.8 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.

2.9 CABINET AND MILLWORK MATERIALS

1. Cabinet doors: 3/4" birch plywood, veneer grade A-B, doors to be flush overlay mounted.
2. Cabinet sides, ends and bottoms (where exposed): 3/4" veneer core birch, grade 1-2 or particleboard as shown.
3. Cabinet back where indicated: 1/4" plywood, fir veneer, grade A-D, or 1/4" hardboard, or as shown.
4. Visible edges of plywood ends shall have a matching solid wood trim edge band full width of plywood edge and mitered at corners. Edge band shall be not less than a 1/4" thick member for plywood up to 1/2" thickness for plywood of and over 5/8" thickness.
5. Trim as indicated on the Drawings.
6. Drawers:
    a. Facings: 3/4" veneer core birch plywood.
    b. Bottoms: 1/4" hardboard.
    c. Sides: 1/2" Y-P C Grade
    d. Millwork hardware:
    Pulls: Rockwood 853 or equal, dull chrome finish, holes 4" centers.
    Hinges: Weber-Knapp #M25057-9 dull chrome, five knuckle closed pin type, full overlay with 270 degree swing.
    Catches: Magnetic type heavy duty. Doors over 36" in height shall have catches at top and bottom.
    Locks: (When required) Hudson #WDL-875. When required, lock can be keyed different and master keyed.
    Drawer Slides: K.V. #1300 or equal.

2.10 WOOD MILLWORK

2.10.1 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.

2.10.2 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.

2.10.3 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.

2.11 HARDWARE

A. Shelf Standards	K & V #255 - Zinc Plate
B. Shelf Rests	K & V #256 - Zinc Plate
C. Shelf Standards	K & V #82 - Anochrome
D. Shelf Brackets & Rests	K & V #182 & 212 - Anochrome
E. Closet Rod (extension)	K & V KV2

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 Fit shelves, partitions, and trim neatly with smooth, sharp cuts, and uniform joints.

3.2.2 Set finish nails below finish surfaces of trim, molding, and other exposed surfaces.

3.2.3 Leave no hammer marks or other defacement in finished surfaces. Torn grain and tool-marked exposed surfaces will not be accepted.

3.2.4 Fill exposed edges of particleboard with rock-hard putty. Leave all exposed surfaces smooth and ready for painting.

3.2.5 Install necessary hardware to provide completely functional facilities.

3.2.6 Verify all measurements at the job before making installation.

3.2.7 Do not store or install millwork in any part of the building until concrete, masonry, and plaster work is dry.

3.2.8 Use bolts to secure wood blocking or nailers to steel.

3.2.9 Where wood furring strips are required, install true to line, level, plumb and well secured in place.

3.2.10 Make all interior finish joints smooth and properly membered or mitered.

3.2.11 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.

3.2.12 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 CABINET HARDWARE INSTALLATION

3.3.1 Receive, store and be responsible for cabinet hardware.

1. Properly tag, index and file all keys in a key cabinet.

3.3.2 Apply hardware in accordance with the manufacturer's instructions, fitting accurately, applying securely, and adjusting carefully.

3.3.3 Use care not to injure the Work when applying hardware.

3.3.4 Protect all hardware and leave in good working order, free from defects.

3.4 PLASTIC LAMINATE AND SOLID SURFACING

3.4.1 Install plastic laminate and solid surfacing for countertops, backsplashes, and shelves as shown on the Drawings.

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

3.4.3 Use butt joints.

3.4.4 Neatly join and fit corners without raw edges showing.

3.5 WORKMANSHIP

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

3.6 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

Section 07 21 00

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 Rigid insulation in exterior masonry wall cavities: 1” foil faced polyisocyanurate sheathing by RMax or equal. Board is to be pre-cut in 16” tall pieces and installed between masonry wall reinforcing.

2.1.2 6" fiberglass batt insulation: R-19 (unfaced) fiberglass batt insulation as manufactured by Owens-Corning or approved equal installed in walls. Insulation shall be secured and supported as required.

2.1.3 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

Section 07 25 00

WEATHER BARRIER

PART ONE – GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide air barrier/weather resistant barrier over exterior of wall sheathing at all locations regardless of whether or not indicated on drawings to protect exterior sheathing and interior walls.

1.2 REFERENCES

A. ASTM International

1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C1193; Standard Guide for Use of Joint Sealants
3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E96; Test Method for Water Vapor Transmission of Materials
7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls

1.3 SUBMITTALS

A. Refer to Section 01 33 23 – Shop Drawings, Product Data & Samples.

B. Product Data: Submit manufacturer current technical literature for each component.

C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

D. Quality Assurance Submittals:

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Installer shall have experience with installation of commercial weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Source Limitations: Provide commercial weather barrier and accessory materials produced by single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
B. Store weather barrier materials as recommended by weather barrier manufacturer.

PART TWO - PRODUCTS

2.1 MANUFACTURER

A. Tyvek as manufactured by DuPont Building Innovations; Wilmington, Delaware or Architect approved equal.

2.2 MATERIALS

A. High-performance, spunbonded polyolefin, non-woven, non-perforated, weather barrier and related assembly components.

B. Performance Characteristics:

1. AATCC–127, Water Penetration Resistance, exceeded at 280.
2. TAPPI T–460, Gurley Hill (sec/100cc) Air infiltration at >1500 seconds.
3. ASTM E 96 Method B(g/m2–24hr.)Water vapor transmission of 200.
4. TAPPI T-41D, Basis weight of 2.7oz/yd.
5. ASTM E96 Method B, Water Vapor Transmission, 28 perms.
6. ASTM E1677, Air Retarder Material Standard Specification, Type I air barrier.

2.3 ACCESSORIES

A. Seam Tape: 3 inch wide.

B. Fasteners:

1. For steel frame construction: DuPont™ Tyvek® Wrap Cap Screws, DuPont Weatherization Systems. 1 5/8" rust resistant screws with 2" diameter plastic cap.
2. For wood frame construction: DuPont™ Tyvek® Wrap Caps, DuPont Weatherization Systems. Nails with large heads or plastic washers.

C. Sealants

1. Polyurethane or elastomeric sealants.

D. Adhesives:

1. Provide adhesive recommended by weather barrier manufacturer.

2.4 FLASHING SYSTEMS

2.4.1 Self-adhered flashing systems for use at window and door openings.

A. DuPont™ Flex Wrap

B. DuPont™ StraightFlash

C. DuPont™ Thru-Wall Flashing

PART THREE – EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 I INSTALLATION

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

B. Install weather barrier prior to installation of windows and doors.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

F. Window and Door Openings: Extend weather barrier completely over openings.

G. Overlap weather barrier

1. Exterior corners: minimum 12 inches.
2. Seams: minimum 6 inches.

H. Weather Barrier Attachment:

1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, space 12 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

3.3 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

END OF SECTION

Section 07 26 16

UNDER SLAB VAPOR
BARRIER/RETARDER

PART ONE - GENERAL

1.1 DESCRIPTION

A. Work included: Provide vapor barrier, seam tape, mastic, pipe boots, and detail strip required for this work including, but not necessarily limited to:

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. Cast-In-Place Concrete Section 03 31 00

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete slabs.
2. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
4. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
5. ASTM E 1643-09 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI)

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.4 SUBMITTALS

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

1.4.2 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.

D. Independent laboratory test results showing compliance with ASTM and ACI Standards. 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.

PART TWO - PRODUCTS

2.1 MATERIALS

A. Vapor barrier products:

1. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834
2. Acceptable material/manufacturers:
   a. Yellow Guard, Poly America, Grand Prairie, TX
   b. Viper Vaporcheck II, Peioria, ILL
3. Architect approved equal.

B. Vapor barrier shall have all the following qualities:

1. Maintain permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 15 mils minimum
3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
4. Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

2.2 ACCESSORIES

A. Vapor barrier accessories:

1. All accessories by Stego Industries LLC., (877) 464-7834 or Architect approved equal.
   a. Seams: Stego tape
   b. Sealing penetrations of vapor barrier:
      1) Stego mastic and tape
   c. Perimeter/terminated edge seal:
      1) Stego Crete Claw (textured tape)
      2) Stego Term Bar
      3) StegoTack Tape (double-sided sealant tape)
      4) One-sided seaming tape is not a recommended method of sealing at the terminated edge.
   d. Penetration Prevention: Beast Foot
   e. Vapor Barrier-Safe Hand Screed System: Beast Screed

PART THREE - EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.

1. Level and compact base material.

B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

3.2 INSTALLATION

A. Install vapor barrier in accordance ASTM E1643.

1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
   a. Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly-placed concrete, per manufacturer's instructions.

   OR

   b. Seal vapor barrier to the entire perimeter wall or footing/grade beam with manufacturer's double-sided tape, or both termination bar and double-sided tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
3. Overlap joints 6 inches and seal with manufacturer's seam tape.
4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
5. Seal all penetrations (including pipes) per manufacturer's instructions.
6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not leave punctures in the vapor barrier.
7. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

END OF SECTION

Section 07 42 93

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

Section 07 61 00

METAL WALL PANELS

PART ONE – GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 SCOPE

1.2.1 The intent of these specifications and drawings is to establish a quality and performance level for design, material, durability and workmanship.

1.2.2 The sheet metal wall panels shall be the design and fabrication of a manufacturer who is regularly engaged in the fabrication of sheet metal roofing and wall panels. All materials shall be new, unused and free from defect. Metal roof panels shall be rated and in compliance with ENERGY STAR.

Approved manufacturers:

Armco
Star
American
MBCI
Alliance Steel Building Systems
Fabral

1.2.3 The following standards and criteria (of most recent issue) shall be used where applicable by this specification:

"Recommended Design Practices Manual" Metal Building Manufacturers Association
"Steel Construction Manual" American Institute of Steel Construction
"Cold Formed Steel Design Manual" American Iron and Steel Institute
"Arkansas Fire Prevention Code" 2021
2021 IBC and Arkansas Amendments

1.3 GUARANTEES

1.3.1 Weathertightness: Weathertightness of roof against leaks and perforations due to workmanship and/or materials shall be guaranteed for 20 years by metal building manufacturer. The Contractor shall furnish a two (2) year guarantee on material and workmanship.

1.3.2 Color: The exterior color finish for the panels shall be guaranteed by the manufacturer for twenty (20) years against blistering, peeling, cracking, flaking, checking and chipping. Excessive color change shall not exceed 5 N.B.S. units (per ASTM D-2244.64%) and chalking shall not be less than a rating of 8 per ASTM D-659.

PART TWO - MATERIALS

2.1 WALL PANEL DESCRIPTION

Wall panels shall be as manufactured by MBCI, Pac-Clad, Farbral, MAC Metal, or Architect approved equal.

MWP-1 - PBR

1. Width: 12”
2. Panel Attachment: Exposed fastener system
3. Gauge: 26 ga.
4. Finish: Smooth
5. Coating: Signature® 300
6. Length: As shown on drawings
7. Colors: As selected by the Architect from full range of available

MWP-2 – Designer Series - Fluted

1. Width: 16”
2. Panel Attachment: On metal furs (Z bar or Hats), Concealed fastener System
3. Gauge: 24 ga.
4. Finish: Smooth
5. Coating: Signature® 300
6. Color: As selected by the Architect from full range of available

MWP-3 – Masterline 16

1. Width: 16”
2. Panel Attachment: On metal furs (Z bar or Hats), Concealed fastener System
3. Gauge: 24 ga.
4. Finish: Smooth
5. Coating: Signature® 300
6. Length: According to Drawings
7. Color: As selected by the Architect (Two Colors)

MWP-4 – Metal Liner Panel (interior): See 13 34 19

PART THREE - EXECUTION

3.1 EXAMINATION

3.1.1 Examine roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to valleys and eaves. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

3.1.3 Examine wall substrate prior to wall panel installation to verify substrate is clean and smooth, free of depressions, waves, or projections.

3.2 INSTALLATION

3.2.1 Install metal roofing and wall panels including accessory materials in accordance with Manufacturer's recommendations and printed instructions.

3.2.2 Immediately after installation remove protective plastic film.

3.2.3 Pipe penetrations:

a. Install flexible EPDM boot directly to roofing in accordance with manufacturer's printed instructions.
b. Seal with silicone sealant.
c. Avoid ribs.
d. Conceal boot with decorative metal hood secured to pipe; do not attach to boot.

END OF SECTION

Section 07 84 00

FIRESTOPPING

PART ONE – GENERAL

1.1 SECTION INCLUDES

A. Firestopping of through penetrations in rated assemblies.

B. Firestopping of construction gaps.

1.2 RELATED SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including but not limited to:

1.	Cast-In-Place Concrete	Section 03 31 00
2.	Masonry	Division Four
3.	Joint Sealants	Section 07 92 00
4.	Gypsum Board Assemblies	Section 09 21 00
5.	Mechanical	Division Twenty Three
6.	Electrical	Division Twenty Six

1.3 REFERENCES

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

Section 07 92 00

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

Section 08 11 00

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

Section 08 14 29

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 minderal 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

Section 08 36 13

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 35 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 INSULATED SECTIONAL DOOR

Furnish and install Thermacore 593 Series insulated steel door as manufactured by Overhead Door Corporation, Dallas, Texas or Architect approved equal.

2.1.1 General: Door section shall be roll-formed galvanized steel no less than .016" thick embossed with a textured pattern, filled with 1-3/8" nominal foamed in place polyurethane insulation (min. R=12.43) 25 gauge end stiles with complete weather seals. Finish shall be baked on polyester. Color selected by Architect from manufacturer's full range of RAL colors. Standard lock.

2.1.2 Track: Galvanized steel 2" in size, 14 gauge. Provide for all mounting requirements of horizontal and vertical track to structure.

2.1.3 Glazing: Insulated double strength glass, tinted if shown on drawings.

2.1.4 Electric Motor Operation: Push button operated control stations with open, close, and stop buttons for flush mounting for interior location.

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

Section 08 41 00

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 – 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

Section 08 71 00

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: Stanley BB179, BB168 and 179, Hager BB1279, BB1168 and 1279 or McKinney as specified. No other substitutions.

2.1.2 Locksets and Cylinders: Schlage ND Series or Sargent 10-line. No other substitutions.

2.1.3 Exit Devices: Von Duprin as specified or Sargent 80 Series. No other substitutions.

2.1.4 Closers: Norton as specified or Sargent 1431 series. No other substitutions.

2.1.5 Fasteners:

2.1.5.1 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.

2.1.5.2 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.

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

2.1.6 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 Schlage Grand Master Key System. All locksets shall be keyed to a new building master key. Furnish six master keys. All locksets shall be keyed alike in groups or keyed different as directed. Furnish four keys for each keyed alike set and two keys each keyed different lock. 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

Mc-McKinney Mfg. Co.
Sc-Schlage Lock Co.
V-Von Duprin, Inc.
E-EPCO
R-Rockwood Mfg. Co.
N-Norton Door Closers
NG-National Guard Products

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.

PART THREE – EXECUTION

Not Used.

END OF SECTION

Section 08 80 00

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" insulated glass, tempered where shown, shall be 1/4" bronze tinted annealed float glass, 1/2" air space and 1/4" clear annealed float glass, Twindow Unit by Pittsburg Plate Glass or approved equal. Air space shall be hermitically sealed using double-seal organic sealants and drying agent.
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

Section 09 21 00

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. For exterior studs, see Section 05 41 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 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.

3.3.2 Steel stud framing system erection: Attach runners at ceiling height, through gypsum panels, to each partition stud with two screws. Insert steel studs in runners and attach each end with one 3/8" pan head screw. Install 1-5/8" stud cross-bracing over stud framing, space 48" o.c. and attach to each framing stud with two 3/8" pan head screws. At hangers, install 12" long stud section for box reinforcing or lap studs 12" and secure each end with two 3/8" pan head screws.

At light troffers or any openings that interrupt the ceiling, install additional cross reinforcing to maintain structural integrity of framing.

3.3.3 Gypsum panel erection: Apply gypsum panels of maximum practical length with long dimension perpendicular to furring channels. Position end joints over channel web and stagger in adjacent rows.

Fit ends and edges closely, but not forced together. Fasten panels to channels with 1" type "S" screws spaced 12" o.c. in field of panels and along abutting ends and edges.

3.4 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 furrdowns. 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.

3.5 TEXTURE COAT

By Painting Contractor; see Section 09 91 00.

3.6 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

Section 09 51 00

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 #1732 (2’ x 2’) or #1733 (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

Section 09 53 00

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.

2.1.1 Main runners: Heavy Duty *(To be used Seismic Cat. "D")*

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.

"D"

2.1.3 Angles: Cold rolled No. 7800, 7/8" x 7/8", hot dipped galvanized with standard white factory applied paint finish with BERC2 clip.

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.

2.2 TRIM SYSTEMS

2.2.1 Axiom – 4" Classic and Prelude XL 360º painted grid.

2.2.2 Color as selected by the Architect from manufacturer's RAL color offering.

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

Section 09 65 00

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.

2.1.6 Rubber base shall be 4" high cove base as manufactured by 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.

2.1.12 Luxury vinyl tile: Nature's Path Collection – "Wood", 4" x 36", as manufactured by Mannington Commercial, or Architect approved equal.

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.

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

Section 09 77 20

FIBERGLASS REINFORCED
WALL PANELS

PART ONE – GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide decorative fiberglass reinforced wall (FRP) panels and trim, as required, where 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.

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 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 Contract, submit:

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

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 manufacturers' recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 GENERAL

2.1.1 Decorative fiberglass reinforced (FRP) wall panels shall be as manufactured by Marlite, Dover, Ohio, or Architect approved equal.

2.1.2 Fire Rating: Class III/C

2.1.3 Finish: Pebbled surface. Color shall be selected by Architect from manufacturer's standard colors.

2.1.4 Other Materials: All other materials, including but not necessarily limited to adhesive, molding, and corner guards, as required, shall be only as recommended by the manufacturer, and as approved by the Architect.

PART THREE – EXECUTION

3.1 PREPARATION

3.1.1 FRP panels shall be installed over substrate as shown on drawings.

3.1.2 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 INSTALLATION

3.2.1 Install all panels in strict accordance with the manufacturer's installation instructions.

END OF SECTION

Section 09 91 00

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 gypsum board surfaces:

3.3.4.1 Apply joint treatment as follows:

1. First and Second Coat: Sheetrock® All-Purpose Joint Compound.
2. Third Coat: Sheetrock® Plus 3 Lightweight Joint Compound.

3.3.4.2 Clean all gypsum board surfaces until they are free from dirt, oil, and all other foreign substance.

3.3.4.3 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.

3.3.4.4 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.l.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 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/Surfacer, 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.)

3.5.2 Interior Gypsum Board:
Epoxy paint (Total DFT = 9.3 mils).

l. 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 Pro Industrial Water Based Catalyzed Epoxy, B73Series.

3.5.3 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 Kem Kromik Universal Metal Primer, B50Z Series. (DFT 3 mils).
3. Second and Third Coat: S-W ProMar 200 Alkyd Semi-Gloss Enamel, B34W200 Series. (1.5 mils DFT/coat).

3.5.4 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 Kem Kromik Universal Metal Primer, B50Z Series. (DFT 3 mils).
3. Second and Third Coat: S-W Pro Industrial Urethane Enamel B54-150 Series (3 mils DFT/coat).

3.5.5 Interior Wood (painted):
Satin 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 ProClassic Interior Alkyd Satin Enamel, B33-1150 Series.
4. Third Coat: S-W ProClassic Interior Alkyd SatinEnamel, B33-1150 Series.

3.5.6 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 ProClassic Interior Alkyd Semi-Gloss, B34 Series
4. Third Coat: S-W ProClassic Interior Alkyd Semi-Gloss, B34 Series.

3.5.7 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.

3.5.8 Interior Wood (painted):
Flat 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 and third coat: S-W ProMar 200 Alkyd Flat, B32-250 Series (4 mils wet, 2.7 mils dry per coat).

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

Section 10 14 00

SIGNAGE

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide all exterior letters, building plaque and 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 EXTERIOR LETTERS

2.1.1 Acceptable Manufacturers: Archway Graphic Designs, Little Rock, Arkansas; DFI Architectural Signs, north Little Rock, Arkansas or approved equal.

2.1.2 Design: Provide fabricated aluminum letters 2” deep, Reverse LED halo illumination installed. 18” tall as shown on drawings. General Contractor shall supply power within 5 feet of the installation area.

2.2 BUILDING PLAQUE

2.2.1 General: Aluminum tablet shall be as manufactured by the Southwell Co., San Antonio, Texas or approved equal.

2.2.2 Material: Tablet is to be cast from F-214 aluminum alloy. Casting shall be free of pits and gas holes and all letters shall be sharp and hand tooled. Borders and faces of raised letters are to be satin finish and background is to be stipple texture.

2.2.3 Finish: Background shall be sprayed with black acrylic lacquer. Plaque shall be chemically cleaned and etched and treated with alodine. Two coats of clear acrylic lacquer shall be sprayed on completed plaque.

2.2.4 Design: Tablet is to be 24 inches wide and 30 inches high with "double line" border design. Letter style shall be "Seneca". Furnish Architect with rubbing of actual pattern for approval prior to casting.

2.3 INTERIOR DOOR SIGNS

2.3.1 Acceptable Manufacturers: Archway Graphic Designs, Little Rock, Arkansas; Best Sign Systems, Montrose, Colorado or Architect approved equal.

2.3.2 Schedule: Provide for door signs at each new interior door except at furnace closets. Exact wording and numbers will be provided by Owner.

2.3.3 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 BUILDING PLAQUE

Locate as directed by the Architect and mount using concealed masonry anchors.

3.2 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

Section 10 21 13

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

Section 10 28 13

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. Toilet paper holder: Bradley Model 5071-50 (non-controlled delivery) surface mounted at 19" above floor. Provide stainless steel tamper proof hex bolts at partitions.

B. 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.

C. 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).

D. Soap/foam sanitizer dispenser: Bradley Model 6A01-11 – surface mounted.

E. Coat hooks: (One per toilet stall.) Bradley Model 9115 with concealed fasteners.

F. Hand dryer: XLERATOR hand dryer, model no. XL-SB, as manufactured by Excel Dryer, Inc. or Architect approved equal.

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

Section 10 41 00

EXTERIOR SECURITY VAULT

PART ONE - GENERAL

1.1 DESCRIPTION

A. Work included: Provide vault for emergency access to building, 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 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 SECURITY VAULT

Provide a rapid entry system for emergency access to the building with a Series 3200 recessed Knox-Vault including a recessed mounting kit as manufactured by Knox Co., Phoenix, Arizona or Architect approved equal.

PART THREE - EXECUTION

3.1 INSTALLATION

Strictly follow manufacturer's installation recommendations and coordinate as required with all trades.

END OF SECTION

Section 10 44 16

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.

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 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 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.

1.4 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 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

Section 10 51 13

METAL LOCKERS

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Work included: Provide metal lockers 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.

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 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 Contract, submit:

1. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
2. Complete shop drawings.
3. Manufacturer's recommended installation procedures.

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 manufacturers' recommendations as approved by the Architect.

PART TWO - PRODUCTS

2.1 GENERAL

Lockers specified are as manufactured by Penco Products, Inc. The following manufacturer is accepted as equal, subject to the requirements of the specifications and drawings.

1. Superior List
2. WEC

2.1.1 "Vanguard": Provide 18" x 18" x 72" double tiered lockers. Units shall include 6" legs with a closed base.

2.1.2 Other materials: All other materials, including but not necessarily limited to anchorage devices, edge trim, spacers, etc., shall be only as recommended by the manufacturer, and as approved by the Architect.

2.1.3 To be supplied with combination pad locks (master keyed).

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.

END OF SECTION

Section 12 24 13

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 shadecloth.
4. Solar Shadecloths:
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 Shadecloth: 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

Section 13 34 19

METAL BUILDING SYSTEMS

PART ONE - GENERAL

1.1 GENERAL CONDITIONS

All work under this section is subject to General Conditions and Supplementary General Conditions and shall be governed by the requirements therein.

1.2 BUILDING DESCRIPTION

1.2.1 The building size will be defined as building line to building line. Clear height under primary frames and roof purlins will be as noted on the architectural building sections. Interior and exterior column locations will be as noted on the structural plans.

1.2.2 Primary Structural: Frames will consist of welded up plate section columns and roof beams complete with necessary splice plates for bolted field assembly. All bolts for field assembly of primary frames will be high strength bolts. End wall structure shall consist of rigid frame with interior bearing columns. Exterior columns and interior columns will be welded "H" sections. Connection of all major structural members will be made with A 325 high-tensile bolts through prepunched or predrilled holes for exact alignment. All structurals will be painted with manufacturer's standard primer with manufacturer's standard surface preparation per structural painting in framing system specifications.

1.2.3 Secondary structurals shall be purlins or girts with a red primer finish applied by coil coater.

1.2.4 The roof system shall be equal to MR-24 panels by Butler Manufacturing Co. Color shall be Butler-Cote 500 FP and shall be selected from manufacturers standard colors - "6 minimum choices". The roof system shall also be in compliance with ENERGY STAR rating.

All roof penetrations (plumbing, mechanical, electrical, etc.) shall be performed by, and therefore the responsibility of, the roofing contractor.

1.2.5 Wall System: The metal faces shall be of 24 gage zinc coated steel and shall be supplied with a factory applied color coating selected from manufacturers standard colors. Panel profile shall be equal to Butlerib II as manufactured by Butler Manufacturing Co.

1.3 QUALITY ASSURANCE

1.3.1 Contractor shall submit contract drawings and specifications to manufacturer. Contractor is ultimately responsible that manufacturer complies with drawings and specifications.

1.3.2 Submit written Letter of Certification prepared and signed by a Professional Engineer, registered to practice in the State of Arkansas verifying that the building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction. The certification must reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end use categories, governing code bodies including year, load applications and deflections. The Letter of Certification must be approved before shop drawings are submitted. Letter of Certification referring to the building order will not be accepted.

1.3.3 In addition to mill certifications of structural steel, the manufacturer shall provide, upon request, evidence of compliance with specifications through testing independent of the manufacturer's suppliers. This quality assurance testing to include structural bolts, nuts, screw fasteners, mastics, and metal coatings (primers, metallic coated products, and painted coil products).

1.3.4 Design Loads:

a. Structural design criteria for the building structural system will be the - 2021 International Building Code.
b. Risk Category per ASCE 7-16 = II
c. Roof live loads are loads produced during the life of the structure by moveable objects. Wind, snow, seismic or dead loads are not live loads. Roof live loads are applied based on the Tributary Area as follows:

   1) 20 PSF Max. Reduction (frames only) 4#/Ft.^{2}

d. The roof snow load used for designing the structure may not be reduced and shall be the product of the following items as per ASCE- 7, 2016:
   Snow Load Coefficient (Ce) 1.0
   Importance Factor (I) 1.0
   Ground Snow Load (Pg) 10 PSF
   Thermal Factor (Ct) Varies. See S1.1.
   Roof Snow Load (Pf) = Calculate per (EQ. 7.3-1, ASCE 7) Minimum Pm = Is x Pg
   The Snow Load (Pf) shall be used for design if it exceeds minimum live load. Rain or Snow additional load-governing codes may require an additional 5 psf be added to the roof snow loads if the roof slope is < 1/2:12.
e. Ultimate wind speed is 106 mph as per ASCE-7, 2016.
   Importance factor = 1.0
   Exposure = C
   Internal Pressure Wind Pressure Coefficient = $\pm$ .18. Coefficients and the design pressures shall be applied per governing code.
f. Seismic design shall be per ASCE 7, 2016 and based on:
   Seismic Risk Category = II
   S_s = 1.097
   S_1 = 0.38
   S_{ds} = 0.776
   S_{d1} = N/A
   Site Class = D
   Seismic Design Category = D
   Seismic Importance Factor; Ie = 1.0
g. Dead Load is the weight of building system construction, such as roof, framing and covering members.
h. Collateral Load - Additional imposed loads required by the contract documents other than the weight of the metal building system. These added loads could include such items mechanical, electrical and ceiling systems.
   1. <u>UNIFORM ROOF LOADS</u>
      Varies. See S1.1.
   2. <u>CONCENTRATED ROOF LOADS</u>
      Loads and locations as shown on framing plans. (Floor loads, mechanical, etc.).
i. Load Combinations: Load combinations used to design primary and secondary structural members shall be according to the governing code.

1.3.5 Calculations for deflections shall be done using only the bare frame method. Reductions based on engineering judgment using the assumed composite stiffness of the building envelope shall not be allowed. When maximum deflections are specified, calculations shall be included in the design data. Deformation calculations for wind shall use 50-year mean recurrence allowable wind loading. Frame deformations used for seismic drift criteria is based upon the amplified deflection as determined by EQ. 12.8-15 of ASCE 7-10. All other seismic deflection criteria is based upon elastic deflections. Refer to the table in the specifications for deflection limits.

MEMBER	SPECIFIED DEFORMATION	MAXIMUM	LOADING
Metal Wall Panels	Perpendicular to girts	L/120	Wind Load
Roof Purlins	Vertical deflection	L/180	DL+LL+Collateral Load
Roof Purlins	Vertical deflection	L/240	LL
Roof Beams & Frames	Vertical deflection	L/240	DL+LL+Collateral Load
Frame Drift at eave	Horizontal deflection	H/240	Wind Load
Frame Drift at eave	Horizontal deflection	H/66	Seismic
Wall Girts for Metal Panel	Horizontal deflection	L/180	Wind or Seismic Load

1.4 WARRANTIES

1.4.1 Weathertightness: Weathertightness of roof against leaks and perforations due to workmanship and/or materials shall be guaranteed for 20 years by metal building manufacturer. The Contractor shall furnish a two (2) year guarantee on material and workmanship.

1.4.2 Color: The exterior color finish for the wall and roof panels shall be guaranteed by the building manufacturer for twenty (20) years against blistering, peeling, cracking, flaking, checking and chipping. Excessive color change and chalking shall be guaranteed for twenty (20) years. Chalking shall not exceed #8 – ASTM D4214 and color change shall not exceed 5 N.B.S. units (ASTM D-2244).

1.4.3 Provide signed warranty of above guarantees at completion of work.

1.5 SHOP DRAWINGS

1.5.1 Shop Drawings: 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 and checked shop drawings for approval by the Architect. All drawings shall clearly show location and sizes of all material, all building dimensions and elevations pertinent to the structure, and any other miscellaneous technical and erection data required for approval and construction. These shop drawings must be approved by the Architect before fabrication and shipment. PARTIAL SUBMITTALS WILL NOT BE ACCEPTED UNLESS APPROVED IN ADVANCE WITH THE ARCHITECT.

1.5.2 Calculations: Three (3) copies of calculations shall be submitted with the shop drawings. Calculations shall be stamped and signed by a professional engineer registered to practice in the state of Arkansas.

1.5.3 Column Reactions: Column reactions for each column shall be submitted for approval. This submittal shall include reactions for each load case and maximum and minimum reactions for each load combination. Reactions shall not include amplified seismic loads or seismic overstrength factors.

1.6 SYSTEM DESCRIPTION

1.6.1 The pre-engineered metal building covered by this specification is to be a beam-and-column structure or steel frames and columns, complete with purlins, girts, wall panels, roof panels, braces and miscellaneous framing required.

1.6.2 The roof slope shall be as noted on plans.

1.6.3 Column spacing shall be as shown on the foundation plan.

1.6.4 Provide frames with eaves heights and clearances shown on plans.

1.6.5 Vertical diagonal bracing shall be permitted only in the sidewall or roof planes where they will not obstruct openings. Horizontal plane bracing shall be permitted providing it is above the building's required interior clear height. Cables for bracing are not allowed. Portal frames shall be located as shown on the drawings.

1.6.6 All roof accessories (roof curbs, snowguards, roof walkways, roof hatches, etc.) shall be provided by a manufacturer approved by the metal building manufacturer and shall be included in the weathertightness warranty.

1.6.7 All column base plates will be pinned connections to foundation.

PART TWO - MATERIALS

2.1 MANUFACTURERS

2.1.1 Manufacturers shall meet the requirements of the International Accreditation Service, Inc. document AC472, “Accredation Criteria for Inpsection Programs for Manufacturers of Metal Building Systems.” Manufactures are not required to be certified by the International Accreditation Service (IAS), but must meet the technical criteria. Upon successful bidding, the manufacture shall submit documentation depicting how it meets the requirements of the IAS. This documentation shall be submitted to the Architect/Engineer and approved prior to contracts being signed.

2.2 STRUCTURAL STEEL

2.2.1 The design of the structure system shall be a clear or multi span frame system with tapered or straight legged columns and roof beams with a gable roof as noted on the drawings.

2.2.2 Field modifications of parts shall be in accordance with the best standard procedures, require the approval of the manufacturer, and shall be the responsibility of the building erector.

2.2.3 Anchor bolt diameter and length shall be as specified by the building manufacturing company's standard anchor bolt layout drawings. Anchor bolts shall be supplied by the contractor, not the building manufacturer. Design of anchor bolts shall be by the building manufacturer.

2.2.4 All structural mill sections or welded-up plate sections shall be designed in accordance with the 1989 AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings," and all cold-formed steel structural members shall be designed in accordance with the 1986 AISI "Specification for the Design of Cold-Formed Steel Structural Members".

2.2.5 The structural system will be designed in accordance with a specified building code. (Refer to Design Loads and Building Codes).

2.2.6 Frames shall consist of welded-up plate section columns and roof beams complete with necessary splice plates for bolted field assembly.

a. All base plates, cap plates, compression splice plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
b. Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing except for field work as noted on manufacturer's erection drawings.

2.2.7 All bolts for field assembly of frame members shall be high strength bolts as indicated on erection drawings.

2.2.8 The endwall structurals shall be cold-formed channel members designed in accordance with the latest AISI Specification or welded-up plate sections designed in accordance with the latest AISC Specification.

2.2.9 The endwall frames shall consist of endwall multi-span frames with endwall bearing posts as required by design criteria.

a. All splice plates and base clips shall be shop fabricated, complete with bolt connection holes. All base plates, cap plates, compression splice plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
b. Beams and posts shall be shop fabricated, complete with holes for the attachment of secondary structural members except of field work as noted on manufacturer's erection drawings.

2.3 SECONDARY STRUCTURAL MEMBERS

2.3.1 Purlin and girts:

a. Purlin and girts precision roll formed.
b. Girts backing metal wall panel shall be “Z” shaped sections.
c. Girts above stud or block walls shall be “C” shaped sections.
d. Purlins shall be "Z" shaped sections.

2.3.2 Eave struts shall be factory pre-punched "C" sections.

2.3.3 Bracing shall be located as required. Diagonal bracing shall be hot-rolled rods and attached to columns and roof beams. Flange braces, purlin braces, etc., when required, shall be cold formed and installed as required.

2.4 WELDING

2.4.1 Welding procedure and operator qualifications and welding quality standards shall be in accordance with the American Welding Society Structural Welding Code. Inspection other than visual inspection as defined by AWS paragraph 8.15.1, shall be identified and negotiated prior to bidding. Certification of welder qualification shall be supplied when requested.

2.5 STRUCTURAL PAINTING

2.5.1 General:

a. All structural steel shall be prime painted as temporary protection against ordinary atmospheric conditions. Subsequent finish, painting, if required, shall be performed in the field by others.
b. Prior to painting all steel shall be cleaned of loose rust, loose mill scale, dirt and other foreign material. Unless otherwise specified, the fabricator shall not sand blast, flame clean or pickle prior to painting.
c. Factory cover all steel with one coat of red oxide primer paint formulated to equal or exceed the performance requirements of Federal Specifications TT-P-636D, TT-P-664C and SSPC Paint-25.

2.5.2 Primary frames:

a. Clean all steel per SSPC-SP2.
b. Apply one coat of water reducible alkyd primer by spray or dip method to a minimum coating thickness of 1.0 mil.

2.5.3 Secondary structurals:

a. Clean all steel per SSPC-SP8.
b. Apply one coat of coil applied polyester primer to a minimum coating thickness of 0.5 mil. (purlin and girts).

2.6 ROOF PANEL

2.6.1 The exposed metal roof covering shall be 24-gage minimum commercially pure G-90 galvanized steel or galvalume coated steel, with factory applied color coating. The color finish applied to the exterior (exposed) surface of the panel shall be of such composition as to provide twenty (20) years of film and color life. Panel configuration to provide the specified load carrying capabilities and deflection requirements of this specification. Roof panels shall be of "standing-seam interlocking" design, Butler MR24 or equal, and secured to the purlins with a concealed structural fastening system. The concealed system shall provide minimal through penetration of the exposed roofing surface and allow the roof covering to move independently of any differential thermal movement by the structural framing system. Except at the concealed fastener, there shall be no thermal contact of the roof panels with the supporting purlin. The standing seams shall have a factory-applied non-hardening sealant, and the seams shall have a continuously locked or crimped together by mechanical means during erection. Roof panels shall be "seamed" same day as installation. Roof panels with lap-type side longitudinal joints and exposed structural fasteners shall not be considered acceptable. Clips shall be compatible with roof covering and have a protective metallic coating. Panel assembly shall have UL90 wind uplift rating. Manufacturer's logo will not be allowed on gable ends.

2.6.2 Roof panel finish: Provide manufacturer's standard shop applied fluoropolymer finish to roof panels.

a. Clean galvanized steel with an alkaline compound, then treat with a zinc phosphate conversion coating and seal with a chromic acid rinse.
b. Apply to exterior surfaces of pretreated galvanized steel a fluoropolymer coating system supplied to provide a total dry film thickness of 0.90 mils minimum. Color shall be Butler-Cote 500FP or approved equal.
c. Interior finish of roof panels shall be same as exterior finish or may be polyester color coat at manufacturer's option.

2.6.4 Physical characteristics of exterior coating:

a. The physical characteristics of the exterior coating shall provide resistance to failure through cracking, checking, crazing, spotting or loss of adhesion.
b. The physical characteristics of the exterior coating shall be measured by laboratory weather simulating tests to obtain test results justifying the manufacturer's 10 year warranty.

2.7 ROOF CURBS

2.7.1 For equipment less than a 1000 pounds, metal roof curbs shall be single piece 14 gage metal (galvalume or aluminum) with all joints welded. Curbs shall be built as per manufacturers suggested size and height. Insulated walls shall be manufactured by a factory authorized fabricator and shall have damper tray, and a cricket/water diverter which shall match roof panel configuration with ribbed edges. Curb shall be supplied and installed by metal building supplier. (Coordinate number and exact location with Mechanical). Curb finish shall match roof.

2.7.2 Metal roof curbs for mechanical equipment in excess of 1000 pounds shall be structural double curb with acoustic style inner curb (20 gauge insulated floor), 14 gauge galvalume as manufactured by Thybar Corporation. All other metal of curbs shall be single piece 14 gauge metal (galvalume or aluminum). All joints shall be welded.

2.7.3 Curbs shall be built as per manufacturers suggested size and height. Insulated walls shall be manufactured by a factory authorized fabricator and shall have damper tray. Shall have cricket/water diverter which shall match roof panel configuration. Curb shall be supplied and installed by metal building supplier. (Coordinate size, quantity, and exact location with Mechanical).

2.8 MISCELLANEOUS

2.8.1 Snow retention system shall be ColorGard, pre-punched, as manufactured by S-5!, matching roof panel color. When installing on MR-24 panels, a S-5-E clamp and SnoClip III shall be used. The S-5-U clamp and SnoClip II shall be used with VSR panels.

2.8.2 Roof walkway shall be by a manufacturer recommended by the metal building supplier. Walkways to be located as shown on drawings.

2.9 WALL SYSTEM

2.9.1 The metal faces shall be of 24 gage zinc coated steel and shall be supplied with a factory applied color coating selected from manufacturers standard colors. Panel profile shall be equal to Butlerib II as manufactured by Butler Manufacturing Co.

2.9.2 The top, bottom and intermediate panel closures, flashings, fascias, gutters, downspouts and trim shall be the building manufacturer's standard, compatible with materials furnished as wall panels. Gutters shall be manufacturer's standard except, in no case, shall the back of the gutter extend less than 2" above front of the gutter.

2.9.3 Liner Panels shall be 24 gauge flat panels (without face beads) with concealed fasteners. Siliconized polyester color shall be selected by Architect from manufacturer’s standard colors.

2.9.4 Solid Soffit Panels, 24 guage steel, with concealed fasteners. Shall be supplied with a factory applied fluoropolymer color coating. The color finish applied to the exterior (exposed) surface of the panel shall be of such composition as to provide twenty (20) years of film and color life. Color shall be selected by Architect from manufacturer’s standard colors.

2.10 INSULATION

2.10.1 In all areas where insulation is exposed, provide 6" R-19 fiberglass blanket insulation with facing composed of 0.0015" white metalized polypropylene film laminated to a fiberglass/polyester blend fabric with a fire resistant adhesive. The resulting facing shall have a water vapor transmission rate of 0.02 US perm (ASTM E96, Procedure A), a beach puncture of 650 scale units and a mullen burst of 250 psi. Tensile strength shall be 195# in the machine direction and 150# in the cross-machine direction, Lamtec Gymguard as manufactured by Lamtec Corp., Mount Bethel, PA. In areas where insulation is not exposed, provide 6” R-19 fiberglass blanket insulation with reinforced vinyl facing.

2.10.2 Double layer roof insulation – “Sag n Bag”: Provide two layers of 4” R-13 fiberglass blanket insulation, one layer with reinforced vinyl facing. Faced material is “sagged” to allow for the second layer. Refer to drawings for placement of each layer of insulation.

2.11 MISCELLANEOUS FRAMING

2.11.1 Provide frames for all mechanical openings as required.

2.11.2 Provide support members between purlins and girts to carry mechanical equipment shown on mechanical plans. This contractor is responsible for coordinating the equipment requirements with members supplied.

2.11.3 Provide lintels and jambs for all openings in wall panels.

PART THREE - EXECUTION

3.1 ERECTION

3.1.1 Erection shall include the setting of all columns and bases and erection of all steel as called for under the contract for furnishing and delivery of pre-fabricated steel building.

3.1.2 Field errors shall not be corrected by burning except with the permission of the Architect.

3.1.3 Brace and guy all structural members until all connections are made.

3.1.4 After erection, touch up all injuries to priming coat and all others where field welding is done. Bolt heads and nuts shall be touched up in field. Use same material as specified for shop coat.

3.1.5 Assembled parts shall be brought into close contact and drift pins shall be used only for bringing members into position, not to enlarge or distort holes.

3.2 WELDING

3.2.1 Welding in shop and field shall be done by operators who have been previously qualified by tests as prescribed in the American Welding Society, "Standard Qualification Procedure". All operators must have successfully passed the welding qualification tests within a 24-month period preceding erection. The Architect shall be provided a copy of the welding qualification test for each operator at no additional cost to Owner.

3.2.2 Equipment to be of a type which will produce proper current so that operator may produce satisfactory welds. Welding machine shall be of 200-400 ampere, 25-40 volt capacity.

3.2.3 Electrodes shall be suitable for positions and other conditions of intended use in accordance with the instruction with each container.

3.2.4 Field welding shall be done by direct current.

3.2.5 Technique of welding employed, the appearance and quality of welds made and methods of correcting defective work shall conform to American Welding Society "Code of Arc Welding in Building Construction", Section 4, "Workmanship".

3.2.6 Surfaces to be welded shall be free from loose scale, rust grease, paint and other foreign material except that mill scale withstanding vigorous wire brushing may remain. A light film of linseed oil may likewise be disregarded. Joint surfaces shall be free from fins and tears.

3.2.7 No welding shall be performed when temperature of the base metal is lower than 0 degrees F. At temperatures between 32 degrees F and 0 degrees F., the surfaces of all areas within 3" of a point where a weld is started shall be heated until they are too hot to touch before welding is started.

3.2.8 Finished members shall be true to line and free from twists, bends and open joints.

3.3 TESTS

3.3.1 Field tests: All field and shop welders shall be tested and certified by an approved testing laboratory. The American Welding Society Operator Qualification Test shall be used as a basis of qualification.

All field and shop operators shall qualify for the following:

Type of Weld	Position of Welding
Groove	Horizontal
Groove	Vertical
Groove	Overhead
Fillet	Vertical
Fillet	Overhead

3.3.2 The Architect's Representative may require strap cuts from welds in any supporting member to stand nick-break test. If strap fails to meet requirements, Contractor shall replace strap cut from member at no charge to Owner. If strap does meet requirements, the Architect shall pay expenses of having metal replaced. In event strap fails, the welder shall be discharged.

3.4 ROOF PANELS

3.4.1 Panels shall be positioned and properly aligned by matching the prepunched holes in the panel end with the prepunched holes in the eaves structural member and by aligning the panel with the panel clip.

3.4.2 Panel sidelaps shall be field seamed by a self-propelled and portable electrical lock seaming machine. The machine field forms the final 180 degrees of a 360 degree Pittsburgh double lock standing seam; all sidelaps sealant shall be factory applied.

3.4.3 Panel endlaps, when required, shall be at least 6", sealed with Butler sealants and fastened together by clamping plates. Sealants shall contain hard nylon beads which prevent mastic from flowing out due to clamping action. The panel laps shall be jointed by means of a two piece clamped connection consisting of a bottom reinforcing plate and a top panel strap. The panel endlaps shall be located directly over, but not fastened to, a supporting secondary roof structural member and be staggered, so as to avoid a four panel lap splice condition.

3.5 WALL PANELS

3.5.1 Structural system shall be plumb before wall panels are attached.

3.5.2 Wall panels shall be sealed with a molded foam closure block that fits the panel configuration at the bottom of the wall panel.

3.6 INSPECTION

The work shall be inspected in the shop and the field. The Contractor shall give proper notice and allow full facilities for this inspection. Notify Architect 48 hours prior to shipping structural steel.

END OF SECTION

The Engineer of Record for Public Works Additions, City of Paragould, Paragould, Arkansas Division 22 of the specifications.

August 16, 2024

Section 22 01 00

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 HVAC condensate piping.
4. Systems of gas piping.
5. Plumbing fixtures and accessories.
6. Insulation.
7. Miscellaneous equipment and accessories.
8. Tests, inspection, balancing and adjustment.

1.1.3 This section includes work on Plumbing and Civil drawings. Reference Section 33 00 00 –Utilities.

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. Domestic water heaters.
3. Pumps, valves and regulators.
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 SOIL CONDITIONS

1.10.1 This specification and drawings in no way implies 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.

1.11 VISITING SITE

1.11.1 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.

1.12 STANDARD PRODUCTS

1.12.1 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.

1.13 STORAGE OF MATERIALS

1.13.1 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.

1.13.2 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.

1.14 EQUIPMENT FURNISHED UNDER OTHER SECTIONS

1.14.1 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.

1.15 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).
4. Backflow preventer test report.
5. Heat trace meggering test.

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 "K" copper below grade to 5'0" beyond building foundation and type "L" copper above grade. Piping 2" and smaller piping below grade shall be factory polyethylene coated type "K" soft copper equal to Streamline as manufactured by Mueller Industries (blue-cold/red-hot); 3" piping shall be rigid type "K" with tubular closed-cell foam insulation. No tee fittings shall be installed below grade. Galvanized pipe shall not be used in any instance.Water piping shall be buried not less than 12" below compacted fill.

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 Soil, waste, and vents - exterior:

2.1.4.1 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.

2.1.4.2 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.

2.1.4.3 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.

2.1.4.4 All pipe sections shall be straight and true in alignment and shall be furnished in (13) feet lengths. Provision shall be made for expansion and contraction at each joint by use of a gasket type joint and integral bell.

2.1.4.5 Bedding and backfilling requirements for PVC gravity sewer pipe listed in paragraph 3.12.3 and the testing requirements listed in Section 3.6.

2.1.4.6 All bends, tees, plugs, adaptors, wyes, or other fittings shall meet with the requirements of the type of pipe used and all joints shall meet with the requirements for the joints listed in Part Three. PVC sewer wyes, tee-wyes, bends or other fittings shall be one piece molded construction with elastomeric gaskets conforming to ASTM 3212 and ASTM F-477, self-cleansing sanitary flow and design meeting ASTM 3034 standards.

2.1.5 HVAC Condensate Drain Piping – Interior and Exterior:

2.1.5.1 Underground and under slab condensate drain pipe, inside building and outside shall be schedule 40 PVC complying with ASTM D2665 as manufactured by Eslon Thermoplastics or equal. PVC cellular core (foam core) pipe and fittings are not acceptable. Piping above grade on exterior shall be schedule 80 PVC. Condensate piping above slab shall be Type L copper except piping in wall or chase may be schedule 40 PVC. Copper pipe and fittings shall be as specified in Division 23 – HVAC.

2.1.5.2 Fittings shall be solvent welded DWV-PVC, complying with ASTM D2665 Standard, and listed by NSF as manufactured by Lasco Fluid Distribution Products.

2.1.5.3 The bedding and cover material for PVC condensate piping shall be free of any solid material.

2.1.5.4 Piping located in a return air plenum shall be cast iron or enclosed with non-combustible material.

2.1.5.5 Insulate all above slab condensate piping with 1/2" closed cell pipe insulation equal to AP Armaflex. Seal all joints and seams with Armaflex adhesive.

2.1.6 Exterior water service piping:

2.1.6.1 Exterior water piping shall be SDR 21 PVC with gasketed joints, 200 PSI for sizes two (2") inches and larger and type "K" hard drawn copper for 1-1/2" and smaller. Minimum depth to be 24". Any mechanical joints shall have to be coated with mastic and covered with two layers of 6 mil visqueen, secure with duct tape. Install No. 12 THHN copper tracer wire for PVC piping. Piping 2” and larger shall be gasketed-joint.

2.1.7 Compressed Air Piping:

2.1.7.1 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:

Pipe Size	Rod Diameter
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 or 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.

TYPE	SIZE RANGE	NUMBER
Ball	2" & smaller (Threaded)	NIBCO T-585 (Class 150)
Ball	2 1/2" & 3" (Threaded)	NIBCO T-FP-600A
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
Plug	3" & smaller	Nordstrom 114
Plug	4" & larger	Nordstrom 115
Air	1/2" & 3/4"	A.Y. McDonald 10710 low pressure ball valve with 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.
3. Cleanout to grade: Wade W-6004-Z-12 cast iron floor cleanout with threaded adjustable housing, ferrule with plug, inverted Ty-Seal hub connection and extra heavy ductile iron tractor top. See detail.

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 DOMESTIC WATER HEATING CABLE

2.8.1 The heating cable shall consist of two (2) 16 AWG nickel coated copper bus wires embedded in radiation-crosslinked semi-conductive polymer core capable of regulating its power output in response to temperature controls. The heating cable core shall be covered with a radiation-crosslinked modified polyolefin dielectric jacket surrounded by a polymer-coated aluminum wrap, and enclosed in a tinned copper braid of 14 AWG equivalent wire size. The braid shall be covered with a 40-mil color-coded polyolefin outer jacket for easy identification.

2.8.2 The controller shall be HWAT-ECO as manufactured by NVENT Thermal, LLC. Contact GFI Solutions at (770)439-9900 for assistance (zoom test is available). The controller shall provide the following features:

a. Flexible temperature control of hot water temperature maintenance systems. (105F to 140F.)
b. Integrated function that lowers the maintain temperature during low use hours to save energy.
c. Heat-up cycle function that increases the water temperature in a stagnant pipe.
d. Building Automation System (BAS) interface that receives a DC voltage to determine the desired maintain temperature.
e. Alarm relay to signal power, temperature or communication problems.

f. Water heater sensor function that alarms and lowers the maintain temperature if the water heater temperature is too low.
g. Master/slave function that allows one HWAT-ECO to control up to eight (8) additional HWAT-ECO controllers.
h. Nine (9) pre-defined programs that can be customized by the user.
i. Controller shall have integral 30mA ground fault circuit interrupter.

2.8.3 The cable shall be installed on the piping without spiraling and shall extend to within 5 feet of fixtures. End of cable cap shall be accessible by access door or removal of ceiling tile.

2.8.4 All material shall be installed in accordance with the Manufacturer's Installation and Operation Manual H53192. After installation, and before and after installation Thermal pipe insulation, the heating cable shall be tested per the manufacturer's recommendations using a 2,500v megger. Minimum electrical insulation resistance during the meggering process shall be $\geq$ 1,000 megohms regardless of circuit length. Ground fault leakage shall not exceed 3 mA at rated voltage regardless of circuit length.

2.8.5 The heating cable, without additional electronic controls, shall automatically maintain all domestic hot water piping at 105° to 125°F. Cable shall be rated for 208 volts. Cable shall be capable of increasing the temperature to 140° F for heat-up cycle maintenance program.

2.8.6 Furnish all accessories (power kit, splice connection kit, end seal, etc.) for complete system installation. When the system is installed it shall be tested by a technician approved by the manufacturer and witnessed by the Owner's Representative. Provide with the close-out documents, a copy of the test reports along with information showing the online registration of this job required to extend the Standard Manufacturer's Warranty to 10 years.

2.8.7 Install "Electric Traced" labels at 10 feet intervals on alternating side of insulation.

2.9 CONCRETE THRUST BLOCKS

2.9.1 Install thrust blocks on water main or service at each change of direction and as indicated on drawings. Thrust block shall have a minimum compressive strength of 3000 psi at 28 days. Blocking shall be supported by undisturbed soil.

2.10 COMPRESSED AIR OUTLETS

2.10.1 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.

2.11 PRESSURE GAGES

2.11.1 Shall be 1/4 inch pipe size, manufactured expressly for compressed air service and marked 0-160 psig pressure range.

2.12 AIR PRESSURE REDUCING VALVE

2.12.1 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.

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.

3.1.2.3 Before installing any waste lines below grade, contractor shall furnish to Architect a complete gradation plan of the building with grades shown at each major group of plumbing fixtures and at each line intersection including connection at main line or manhole.

3.1.2.4 Install floor cleanouts and floor drains prior to slab pour; however, if block outs are required, they shall be formed with PVC pipe in lieu of wood blocking. No block-outs will be permitted in areas which are to remain exposed slab.

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 Pipe expansion:

3.1.5.1 Swing joints, turns, expansion loops or long offsets shall be provided where shown on the Drawings or where necessary to allow for the proper expansion of piping. Broken pipe fittings due to rigid connections must be removed and replaced at the mechanical contractor's expense. Swing joints shall consist of not less than four fittings on horizontal mains and three fittings on risers and runouts to risers. Connections to equipment shall be made in such a manner that movement of the risers will cause no strain or movement of the equipment.

3.1.5.2 At any point where pipe crosses a roof expansion joint, the contractor shall install an expansion loop without exception.

3.1.6 Pipe anchors:

3.1.6.1 Pipe anchors shall consist of heavy steel collars with lugs and bolts for clamping the pipe and for attaching anchor braces, unless otherwise shown on the drawings. Anchor braces shall be installed in the most effective manner to secure the desired results, using turnbuckles where required. No supports, anchors or stays shall be attached in places where they will injure construction either in the installation or by weight or expansion of the pipe.

3.1.7 Sleeves:

3.1.7.1 All pipes passing through masonry construction shall be fitted with 20 gauge galvanized steel sleeves. 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 specified, sleeves shall be two pipe sizes larger than the passing pipe, when the pipe is uninsulated, and one pipe size larger than the overall outside diameter of the pipe insulation when insulated. Sleeves in floor slabs or walls which are not fire-rated 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 securely fastened in place prior to pouring concrete and caulked with flexible caulking or Link-Seal device as applicable. Sleeves or pipes shall not be installed in spread footing. Install pipe below footing; above footing with sleeve; or step footing to accommodate sleeve above. Core drilling will not be permitted without the consent of the structural engineer. Sleeves in grade beams shall be installed near center (additional grade beam depth may be required, coordinate with Structural Engineer).

3.1.7.2 Chrome plated brass escutcheons shall be provided on all pipes passing through building construction in exposed spaces. Pull tight to wall and secure. Lavatory and sink stops may be stamped chrome plated metal.

3.1.8 Cold water piping, general:

3.1.8.1 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.
c. Provide make up water and supply to all equipment furnished by others where shown on the plans and/or as required with stop valves located as required for the equipment supplied.
d. Provide water pressure regulators in the main cold water supply line to the building where indicated on plans. Contractor shall test pressure early and late in the day at times as directed by engineer, and shall provide written documentation of tests to Architect. If the supply pressure exceeds 75 PSIG a pressure regulator must be installed.
e. All water connections and taps shall be made above finish grade. Any connections below the slab shall be removed at the contractor's expense.

3.1.9 Hot water piping, general:

3.1.9.1 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.

3.1.10 Pipe identification:

3.1.10.1All 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.

3.1.10.2 The following lines shall be labeled:

1. Compressed Air – Blue with White Letters
2. Hot Water – Yellow with Black Letters
3. Heat Trace – Yellow (Caution)
4. Cold Water – Green with White Letters

3.1.10.3Labels shall be equal to Seton Opti-Code Pipe Marker System. Secure to pipe with "Arrows-On-A-Roll" tape on both ends of label.

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 (NON-HEAT TRACE)						
INSULATION THICKNESS FOR PIPE SIZES						
COLD WATER LINES		0.5" THICKNESS				
		Circulating Main & Runouts (see note)				
Service Water Heating Tempature	Noncirculating runouts 3/4" and less not exceeding 12 ft. in length	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.

HEAT TRACE PIPE INSULATION		
SIZE	PS INSULATION SIZE	THICKNESS
1/2"	3/4"	1"
3/4"	1"	1"
1"	1-1/4"	1"
1-1/4"	1-1/2"	1-1/2"
1-1/2"	1-1/2"	1-1/2"
2"	2"	2"

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. Hot water lines shall not be below slab unless specifically indicated. Where indicated as below slab insulate with 3/4" Halstead Insul-tube, coat with Halstead protective coating and install in sand bedding.

h. 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 and 400 Series for PVC (when specified). Furnish extensions and accessories as required for offset tailpiece, 2-compartment sink and disposer installations. Wrap 1/2" Armaflex sheet insulation around disposer with glued joints and seams as required for protection.

3.3 FLASHING

3.3.1 Where mechanical items penetrate the roofing, the contractor shall coordinate location and size as required for factory vent flashing assembly. The flashing shall be furnished and installed by the Roofing Contractor in strict accordance with the Roof Manufacturer's recommendation.

3.3.2 If single ply membrane roof is used, contractor shall use factory vent flashing assembly as recommended by Roofing Manufacturer. Coordinate locations with Roofing Contractor.

3.4 ELECTRIC MOTORS AND CONNECTIONS, GENERAL

3.4.1 The contractor furnishing the motor shall install it on suitable foundations complete and ready for electrical connections. The Contractor furnishing the motor shall furnish and deliver to the electrical contractor all starting equipment required for operation of the motor, unless otherwise provided for in Division Twenty-Six of these specifications. Each and every motor shall be furnished with a starter with over current protection. The labor and material for the electrical connection of all motors and the erection and connection of all motor starters and panelboards shall be done by the electrical contractor. The Contractor furnishing the motors and starters shall provide all labor and materials for the installation of the interlock wiring between starters and all automatic controllers unless otherwise provided for under Division Twenty-Six of these specifications.

a. Starters which are interlocked for automatic operation shall have ON-OFF switches. All starters shall have pilot lights.

b. All controls or devices installed outdoors shall be completely weather proofed.

c. Unless otherwise specified, this contractor shall furnish all necessary controls and provide all labor and material for proper installation. All controls shall be installed strictly according to the Electrical Division of these specifications.

d. This contractor shall notify the electrical contractor of any changes required in the electrical plans because of substitution of equipment or variation in electrical requirements due to changes in the equipment manufacturers and shall accept all responsibility for such change and variation.

e. Contractor shall verify on electrical plan any additional starters required. Manual motor starters shall be furnished and installed by the electrical contractor.

3.5 CROSS CONNECTIONS

3.5.1 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.

3.6 TESTING

3.6.1 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.

3.6.2 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,

3.6.3 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.

3.6.4 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.

3.6.5 Compressed Air System: Cap and fill general-service compressed air piping with oil-free dry air or gaseous nitrogen to pressure of 10 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.

3.6.6 Reduced Pressure Backflow Preventer: All backflow assemblies shall be tested by an assembly testing technician certified by the state. Provide backflow assembly test forms to water utility company and Architect.

3.7 STERILIZATION

3.7.1 Domestic water piping systems:

3.7.1.1 The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlet.

3.7.1.2 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.

3.8 CERTIFICATE OF INSPECTION

3.8.1 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.

3.9 PLUMBING FIXTURES AND EQUIPMENT

3.9.1 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.

3.9.2 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.

3.9.3 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.

3.10 EXCAVATING AND TRENCHING FOR PIPING

3.10.1 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.

3.10.2 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.

3.10.3 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, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor, at his expense.

3.10.4 Separation of private utilities: Water, gas and sewer piping shall be installed in separate trenches. In no case shall any utility piping be installed in same trench as electrical lines, TV cable, intercom, etc. The underground water service pipe and the building drain, or building sewer shall not be less than 10 feet apart horizontally and shall be separated by undisturbed or compact earth When approved by Engineer the water and sewer may be installed in same trench provided the water is 12" above the sewer at all points. The combining of gas and water must be approved by the Engineer and the Local Administrative Authority.

3.11 BACKFILLING OF TRENCHES

3.11.1 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.

3.11.2 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.

3.11.3 The embedment for schedule 40 PVC sanitary sewer below slab and PVC domestic water on exterior shall consist of crushed stone or rock (3/4” maximum) Class 1 material which is 6" below and above the pipe. Embedment for PVC sanitary and storm sewer piping exterior of building shall be manufactured angular, granular material, 1/4 to 1-1/4 inches in size (no fines), 6" below and above the pipe. The remaining backfill shall be compacted as outlined in Section 31 22 00 – Site Grading. The maximum bury of PVC pipe shall be sixteen (16) feet.

3.11.4 Backfill for trenches not below building, paving, sidewalks, etc., may be compacted to 90% Standard Proctor in accordance with ASTM D698. Backfill may be SB-2 below paving or asphalt and select native fill below topsoil. Select fill material used for pressure PVC pipe bedding must meet AWWA-C605 Standards (3/4" maximum for angular rock and 1 1/2" maximum for rounded rock).

3.11.5 Tests for displacement of sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the Contractor at his expense.

3.12 CUTTING AND PATCHING

3.12.1 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.

3.13 DEFECTIVE WORK

3.13.1 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.

3.14 CLEANUP

3.14.1 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.

3.15 GUARANTEE

3.15.1 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.

3.15.2 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.

3.16 HANDICAPPED MOUNT HEIGHTS

3.16.1 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

3.16.2 All handicapped fixtures to meet requirements of the Americans with Disabilities Act (ADA) 2010.

3.16.3 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

Section 22 13 43

PUMPING STATIONS

PART ONE – GENERAL

1.1 GENERAL

A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide a complete pumping system as specified herein.

B. The Pumping System shall consist of two (2) sewage grinder pump four (4) level control switches, discharge plumbing with disconnect, lifting chains, pedestal for mounting control panel on sump, fiberglass basin with steel lid and NEMA 3R control panel. Structure and dimensions to be shown on the drawings..

1.2 PRE-BID SUBMITTALS

A. To insure conformance with design and specification requirements, all pump station manufacturers intending to bid this project shall prepare and submit a complete pre-bid submittal not less than 14 days prior to bid date. This submittal shall include, but not be limited to: detailed construction drawings calling out components and materials of construction, an illustrated parts breakdown showing system components, parts relationship and nomenclature. A proposed electrical schematic wiring diagram. All equipment not meeting the specification shall include a written list of deviations and a sound engineering explanation justifying its acceptance as an equal.

B. The Engineer will review the submittals and respond in writing to each manufacturer as to approval or disapproval. Approved manufactures' shall include a copy of the Engineers approval letter with their proposal to the bidding Contractors.

PART TWO –PRODUCTS

2.1 SEWAGE PUMPS

A. Each pump shall be of the sealed submersible type, Model HPG as manufactured by the Hydromatic Pump Company. The pump volute, motor and seal housing shall be high quality gray cast iron, ASTM A-48, Class 25. All external mating parts shall be machined and Buna N Rubber. O-ring sealed on a beveled edge. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 Series stainless steel.

2.2 OPERATING CONDITIONS

A, Each pump shall be rated 5 HP, 208 volts, 3 phase, 3450 RPM. The pump will have an operating point of 60 GPM @ 100’ of headloss.

B. Each station will operate with a minimum pump efficiency of 65%. The pump shall be non-overloading throughout the entire range of operation without employing service factor. The pump shall reserve a minimum service factor of 1.15. The performance head and capacity performance, the pump efficiency, solid handling capacity, and reflect motor service factor.

2.3 ELECTRICAL POWER CORD

A. Electrical power cord shall be STW-A, water resistant 600V, 60 degree C., UL and CSA approved and applied dependent on amp draw for size.

B. The pump shall be triple protected with a compression fitting and two epoxy potted areas at the power cord entry to the pump. A separation between the junction box area of the pump and the motor by a stator lead sealing gland or terminal board shall not be acceptable.

C. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to bare wire, at staggered intervals, and each strand be individually separated. This area of the cord cap shall then be filled with epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.

D. The power cord leads shall then be connected to the motor leads with extra heavy connectors having brass insets with a screwed wire to wire connection, rather than a terminal board that allows for possible leaks.

E. The connection box wiring shall be separated from the motor housing wiring by stripping each lead down to bare wire, at staggered intervals, and separating each strand. This area shall be filled with an epoxy compound potting. Fiberglass terminal boards which are subject to heat fatigue and cracking, and which may lead to possible leaks shall not be acceptable.

F. The cord cap assembly where bolted to the connection box assembly and the connection box assembly where bolted to the motor housing shall each be sealed with a Buna N Rubber O-ring on a beveled edge to assure proper sealing.

2.4 MOTOR

A. The stator, rotor and bearings shall be mounted in sealed submersible type housing. The stator windings shall have Class F insulation, (155 degree C or 311 degree C), and a dielectric oil filled motor, NEMA B design. Further protection shall be provided by on winding thermal sensors. Because air-filled motors do not dissipate heat as efficiently as oil-filled motors, they shall not be acceptable.

B. The pump and motor shall be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped. The pump shall not require cooling water jackets. Dependence upon, or use of, water jackets for supplemental cooling shall not be acceptable.

C. Stators shall be securely held in place with a removable end ring and threaded fasteners so they may be easily removed in the field without the use of heat or a press. Stators held by a heat shrink fit shall not be acceptable. Stators must be capable of being repaired or rewound by local motor service station. Units which require service only by the factory shall not be acceptable. No special tools shall be required for pump and motor disassembly.

D. Pump shall be equipped with heat sensors. The heat sensor(s) (one on single phase, two on three phase) shall be a low resistance, bi-metal disc that is temperature sensitive. It (they) shall be mounted directly in the stator and sized to open at 120^{O}C or 130^{O}C and automatically reset at 30^{O}-35^{O}C differential. The sensor shall be connected in series with the motor starter coil so that the starter is tripped as a heat sensor opens. The motor starter shall be equipped with overload heaters so all normal overloads are protected by external heater block.

2.5 BEARING AND SHAFTS

A. An upper single row ball radial bearing and a lower single row ball thrust bearing shall be provided. Bearings shall be permanently lubricated by the dielectric oil which fills the motor housing.

B. The shaft shall be machined from solid 400 series stainless steel and be designed with large diameters and minimum overhang to reduce shaft deflection and prolong bearing and seal life.

2.6 SEALS

A. The pump shall have two mechanical seals, mounted in tandem, with an oil chamber between the seals. John Crane Type 21, BF1C1, seals shall be used with the rotating seal faces being carbon and the stationary seal faces to be ceramic. The lower seal shall be replaceable without disassembly of the seal chamber and without the use of special tools. Pump-out vanes shall be present on the backside of the impeller to keep contaminates out of the seal area. Units which require the use of tungsten-carbide seals or foreign manufactured seals shall not be acceptable. Seals shall be locally available.

The pump shall be equipped with a seal leak detection probe and warning system. This shall be designed to alert maintenance personnel of lower seals failure without having to take the unit out of service for inspection or requiring access for checking seal chamber oil level and consistency.

B. There shall be an electric probe or seal failure sensor installed in the seal chamber between the two tandem mechanical seals. If the lower seal fails, contaminants which enter the seal chamber shall be detected by the sensor and send a signal to operate the specified warning device.

C. Units equipped with opposed mechanical seals shall not be acceptable.

2.7 IMPELLER

A. Impeller shall be of bronze construction and non-overloading. Impeller shall be of the multi-vane, semi-open design with pump-out vanes on the backside of the impeller to prevent grit and other materials from collecting in the seal area. Impeller shall not require coating. Because most impeller coatings do not remain beyond the very early life of the impeller, performance data submitted shall be based on performance with an uncoated impeller. Attempts to improve efficiency by coating impeller shall not acceptable.

B. Impeller shall be hydraulically and statically balanced. The tolerance values shall be as listed below according to the International Standard Organization grade 6.3 for rotors in rigid frames. The tolerance is to be split equally between the two balance planes which are the impeller shrouds.

RPM	TOLERANCE
3500	.01 in. - oz./lb. of impeller weight

2.8.1 GRINDER CUTTERS

A. The combination centrifugal pump impeller and grinder unit shall be attached to the common motor and pump shaft made of 416 stainless steel. The grinder unit shall be on the suction side of the pump impeller and discharge directly into the impeller inlet leaving no exposed shaft to permit packing of ground solids. The grinder shall consist of two stages. The cutting action of the second stage shall be perpendicular to the plane of the first cut for better control of the particle size. The grinder shall be capable of grinding all materials found in normal domestic sewage, including plastics, rubber, sanitary napkins, disposable diapers, and wooden articles into a finely ground slurry with particle dimensions no greater than 1/4 inch. Both stationary and rotating cutters shall be made of 440C stainless steel hardened to Rockwell 60C and ground to close tolerance.

B. The upper (axial) cutter and stationary cutter ring shall be reversible to provide new cutting edges to double life. The stationary cutter ring shall be pressed into the suction opening of the volute and held in place by three (3) 300 Series stainless steel screws. The lower (radial) cutter shall macerate the solids against the I.D. of the cutter ring and extrude them through the slots of the cutter ring. The upper (axial) cutter shall cut off the extrusions, as they emerge from the slots of the cutter ring to eliminate any roping effect which may occur in single stage cutting action. The upper (axial) cutter shall fit over the hub of the impeller and the lower (radial) cutter shall be slip fit and secured by means of peg and hold and rotate simultaneously with the rotation of the shaft and impeller. The grinding mechanism shall be locked to the shaft by a 300 Series stainless steel countersunk washer in conjunction with a 300 Series stainless steel flat head cap screw threaded into the end of the shaft. Suppliers furnishing pumps with grinders which cannot be reversed for double wear shall be required to furnish a spare set of grinders for each pump.

2.9 PAINTING

A. The pump shall be painted after assembly, but before testing with lead free air dried enamel. The paint shall be applied in one coat with a minimum mil thickness of 3 to 4 mils.

2.10 FIBERGLASS SUMP BASIN

A. Station to include a 60” diameter x 120” long FRP basin with the following qualities:

B. RESIN The resins used shall be a commercial grade unsaturated polyester resin (isophthalic). Basins/wetwells utilizing orthophthlalic resin shall not be considered acceptable.

C. REINFORCING MATERIALS The reinforcing materials shall be commercial grade "E" type glass in the form of mat, chopped roving, roving fabric, or both, having a coupled agent that will provide a suitable bond between the glass reinforcement and the resin.

D. FILLERS AND ADDITIVES Fillers of any type shall not be utilized. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of this specification. The resulting reinforced-plastic material must meet the requirement of this specification.

E. EXTERIOR SURFACE The exterior surface shall be relatively smooth with no sharp projections. Hand-work finish shall be utilized to insure that enough resin is present to eliminate exposed fibers. The exterior surface shall be free of delamination, exposed fibers and blisters larger than 0.5 in. in diameter.

F. INTERIOR SURFACE The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, blisters larger than 0.5 in. in diameter, and wrinkles of 0.125 in. or greater in depth.

G. DIMENSIONS The dimensions shall be as shown on the drawings.

H. WALL STIFFNESS The basin/wetwell shall have a pipe stiffness as shown below (per 1984 ASTM standard No. D3753, Table 1):

BASIN/WETWELL DEPTH (In Feet)	PIPE STIFFNESS
3 - 6	.72
6.5 - 12	1.26
12.5 - 20	2.01

I. MATERIAL PROPERTIES The following properties shall be established for each type of construction used in the basin/wetwell.

J. MATERIAL COMPOSITION The wall and bottom laminates shall have a glass content of 30% +/- 5% glass content (by weight) and isophtalic resin content of 70% +/- 5%.

K. FLEXURAL STRENGTH AND MODULES The flexural strength and modulus of the basin/wetwell wall in the hoop and axial directions shall be a minimum of 800,000 PSI

L. HARDNESS The minimum barcol hardness shall not be less than 90% of the resin manufacturers minimum valve for the cured resin.

M. THICKNESS The basin/wetwell wall thickness shall be adequate to maintain structural integrity when installed in the following conditions:

1) Soil modulus of 700 PSI.
2) Soil density of 120 lbs. per cu. ft.
3) Luscher's safety factor of 2.

The tank bottom shall extend past the tank walls so that the O.D. is approximately 4" larger in diameter than the O.D. of the sidewalls. This larger diameter shall serve an an anti-floatation flange. Contractor shall place the tank on a concrete pad and either fill with grout covering the anti-floatation flange or secure with steel clips catching the anti-floatation flange and anchored to the concrete pad. Anti-floatation flange shall not require bolt holes to secure the tank to the concrete pad.

The top flange and cover O.D. shall assure a tight fit and afford ease of access not possible with recessed covers, noncorroding stainless steel helicoils shall be inserted in all bolt holes of the top flange and shall be positively locked with threads and resin to prevent stripping.

2.11 BASIN COVER

A. Basin cover shall be aluminum circular of the diameter indicated on the plans and shall have a rectangular opening made with aluminum frame and shall have a hinged cover. A locking hasp and a lifting handle shall be provided on the cover.

All fasteners shall be of stainless steel construction.

The cover shall be furnished with a socket to receive a portable lifting hoist, and green vinyl coated steel vent with a 2" female NPT inlet. Screen shall be brass #20 mesh. The vent shall be attached to the basin cover with a malleable iron locknut. All malleable iron fittings will be tar base epoxy coated.

2.12 DUPLEX PUMP CONTROL

A. The pump control enclosure shall be a NEMA type 3R, minimum 14 gauge, galvanized and painted with gray enamel. The enclosure shall be equipped for wall mounting and a padlockable hinged coverdoor with draw latches. All operator controls (pilot lights, selector switches, etc.) shall be installed on an interior mounted aluminum inner door and clearly labeled with engraved, two ply, laminated labels.

The pump control equipment shall include, but not limited to, combination starters, circuit breakers, hand-off-auto selectors, pump run lights, seal failure lights, and lugs for connecting all external controls. Equipment shall be mounted to a removable back panel. Equipment shall be mounted using cadmium plated machine screws and drilling and tapping back panel, wiring on the back panel shall be enclosed in a plastic wire tray, laced wire bundles are not acceptable. An "as built" wiring diagram (ladder type schematic) shall be permanently attached to the inside of the enclosure door. All control wire shall be labeled on both ends corresponding to the numbering system on the as built diagram. A high level alarm light shall be mounted on the top of the control enclosure. The alarm shall be of the auto/reset type.

2.13 LIFT-OUT RAIL SYSTEM AND DISCHARGE PIPING

A. The lift-out rail system shall consist of bottom rail supports, upper rail supports, and stainless steel lifting chains for each pump. The rails shall be constructed of minimum 3/4" stainless steel pipe and not less than 2 rails per pump shall be supplied.

The discharge piping shall consists of 2" inch stainless steel schedule 40 pipe, and shall include a 2" brass rail guide pitless adapter disconnect, brass check valve and brass gate valve. Discharge from station shall be fitted with 2" NPT brass coupling. Piping configuration and size shall be as drawn on the plans. All piping external to the station shall be installed by the Contractor.

2.14 SUMP LEVEL CONTROLS

A. Float switches shall be supplied to control sump level and alarm signal. The switches shall be sealed in a polypropylene float for corrosion and show resistance. The support wire shall be 18-2SJOW/A. A weight shall be attached to cord, above the float to hold switch in place in sump and efficiently prevent sharp bends in the cord when float operates. A quantity of four (4) floats shall be provided to control level, and alarm conditions.

2.15 PUMP LEVEL CONTROL SEQUENCE

A. The level control shall be of the 4 float level type. At the low level, all pumps shall stop, As the liquid rises to the second level, the lead pump shall start and pump down to the low level (pumps will alternate lead) If the lead pump does not start at the second level or if the inflow exceeds the capability of the lead pump and the level rises to the third level, the lag pump will start. If the level continues to rise to the fourth level the high level alarm light will activate.

PART THREE – EXECUTION

Not Used

END OF SECTION

The Engineer of Record for Public Works Additions, City of Paragould, Paragould, Arkansas Division 23 of the specifications.

August 16, 2024

Section 23 00 00

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.

1.1.1.2 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.

1. Systems of heating and air conditioning
2. Miscellaneous equipment and accessories
3. 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.

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
6. 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:

1. Heating & Cooling Equipment
2. Duct Insulation, Joint Sealant and Exterior Coating
3. Air Devices and Louvers
4. Manual Dampers
5. Electric Heaters
6. Exhaust Fans
7. Duct Takeoffs
8. 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.

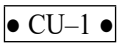
1.8 OPERATION AND MAINTENANCE INSTRUCTIONS

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, energy recovery ventilators, exhaust fans, boilers, pumps, etc.) excluding PTAC units shall be labeled with black and white laminated bakelite nameplates securely fastened to the device.

1. Nameplate size shall be 1” x 2 1/2 “ with beveled edges and 1/4” letters.
2. Nameplate shall have the equipment designation as noted on plans.
3. Nameplates shall be secured to equipment with rivets or sheetmetal screws.
4. Embossed stick back will not be allowed.
5. Nameplates for switches may be omitted for equipment where the disconnect is adjacent to the unit and is labeled by the Electrician.
6. 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.

1.10.2 Contractor shall review all kitchen rough-in drawings before proceeding with work in kitchen area and shall install ductwork, connections, etc. as indicated on the Drawings.

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", 3/4 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 Thermostats for packaged units without hot gas reheat, gas fired and heat pump split systems shall be programmable equal to Carrier 33CS2PP2S-02 which is compatible with 1 and 2 stage heating/cooling for heat pumps and gas or electric heat systems. Thermostats shall have seven (7) day independent programming, automatic changeover, holiday scheduling, 4 hours setback override, lost power memory, security keypad lockout, compressor time guard and adjustable set point limiting.

2.4.2 Wall mounted CO^2 shall be equal to Honeywell C7232 with LCD display.

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 Thermostats are to be mounted at 48" to top of box A.F.F.

2.4.5 Refer to equipment operational sequence on drawings.

2.4.6 Control of fan coil heat pump split systems shall be remote as provided by equipment supplier. Mount on wall as indicated on drawings.

2.7 ROOF CURBS AND FLASHING

2.7.1 On Metal Roofs where mechanical items require curbs or flashing when penetrating roof, the Mechanical Contractor shall coordinate location and size for roofing Contractor to furnish and install a factory vent flashing assembly or curb in strict accordance with the Roof Manufacturer's recommendation.

2.7.2 Fresh air intakes shall be located 10'-0" minimum from flues, exhaust fans, plumbing vents, gas regulators, etc., which could affect the air quality.

2.9 CONDENSATE LINES

2.9.1 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.

2.10 REFRIGERANT PIPING AND FITTINGS

2.10.1 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.

2.10.2 Joints shall be made with wrought copper fittings and silfos.

2.10.3 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.

2.10.4 Do not run refrigerant lines thru return air plenum unless approved by engineer.

2.10.5 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.

2.10.6 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.

2.10.7 Filter Driers: Sporlan HPC-100 Series Catch-All Liquid Line Dryer. Size per manufacturer's recommendation. Provide reversible type for heat pump applications.

2.10.8 Filter dryers and sight glasses are not required for ductless split systems.

2.11 MECHANICAL EQUIPMENT

2.11.1 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.

2.14 MANUAL DAMPERS

2.14.1 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.

2.14.2 Rectangular dampers shall be equal to Ruskin MD25, 22 ga. galvanized steel 3/8" square axle shaft and molded synthetic bearings.

2.14.3 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.

2.15 TAKE-OFF FITTINGS

2.15.1 Round supply take-off fittings shall be 45^{o} 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:

1. 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.
2. All ducts with one side over 24 inches shall be cross broken for rigidity.
3. All duct dimensions are outside dimensions.
4. Flash and counter-flash all piping, ductwork, etc., penetrating walls and roof, using minimum 20 gauge galvanized steel, unless shown otherwise.
5. 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.
6. All four (4) sides of return air plenums, excluding ceiling plenums, shall be completely lined with 1" duct-liner.
7. 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.
8. 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.
9. Exterior supply and return air ducts shall be coated with protective coating equal to Silver Dollar Fibered Aluminum Roof Coating. Ducts shall be cross broken on top to eliminate any standing water. No seams on top or sides are acceptable.

10. 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.
11. 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.
12. 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.
13. 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.
14. Metal ductwork shall not be installed until building roof is in place and interior is in the dry. Failure to comply will result in replacement of ductwork at no additional cost to Owner.
15. 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:

1. 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.
2. 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.
3. 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.
4. All transfer ducts shall be in a "U" configuration and fully insulated with grilles located on both ends of the duct.

3.1.4 Balancing and adjusting:

3.1.4.1 All systems shall be balanced and adjusted to the satisfaction of the Owner and the Engineer including the following items:

1. Adjust all fan belts to the proper tension.
2. Check all motor amperages and set speeds to avoid overloading.
3. This contractor shall have all air systems, including exhaust systems, balanced to provide performance specified. Complete air balance forms shall be delivered to the design engineer for approval. Amount of fresh air shall be noted.
4. Check all systems for noise and vibration which may be objectionable.
5. When Contractor is satisfied that all systems may be acceptable to the design engineer, the Contractor shall call for an inspection.
6. Packaged air conditioning system shall be balanced to provide performance specified. Amount of fresh air shall be noted based on minimum/maximum CO^2 level. (Refer to outside air schedule and sequence of operation.) Provide minimum of three (3) readings at different levels of CO^2.
7. Packaged Air Conditioning system with Dehumidification System (hot gas reheat) shall be tested for proper operation. Adjust space temperature sensor to deactivate cooling cycle and lower Relative Humidty Sensor setting as required to activate Dehumidifation Cycle. Document Supply Air temperature and space Relative Humidity decrease.
8. Systems shall not be accepted until properly balanced.
9. 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.

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.

1. Units must not be operated temporarily without filters. When the job is accepted, all used filters shall be replaced with clean, unused filters.
2. Provide one (1) extra set of filters for each unit which does not have permanent filters to the Owner.
3. Permanent filters shall not be used during construction.
4. 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

The Engineer of Record for Public Works Additions, City of Paragould, Paragould, Arkansas Division 26 and 27 of the specifications.

August 16, 2024

Section 26 05 00

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.

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

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" reproducibles, 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. 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.

I. 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 that 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 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.

3.08 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.

3.09 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.

3.10 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.

Voltage	Depth (Minimum)
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 DEMOLITION

A. Remove all branch and feeder conduit and wire back to panelboards.

Where walls, ceilings, or floors are to remain remove all devices and wire where indicated. Provide blank cover plate at outlet box.

B. All items shown to remain active shall be furnished with necessary accessible junction boxes and all conduit and wire as required to maintain circuit continuity.

C. All outlet boxes which must be removed due to demolition but which must remain active in order to maintain circuit continuity shall be relocated into ceilings or walls and shall be accessible.

D. All material fixtures and equipment to be reused shall be removed and stored on site. Before reinstallation all items are to be cleaned, tested and prepared for re-use. Fixtures shall be re-lamped and new ballasts installed.

E. Demolition includes complete wrecking of structures and removal and disposal of demolished materials, as shown on drawings and herein specified.

F. Interior demolition includes complete wrecking of interior partitions, work above ceilings, finishes, and structures and removal and disposal of demolished materials, as shown on drawings and herein specified.

G. The Owner shall have the option of retaining any items removed. The Contractor shall deliver these items to the Owner's designated storage area. Any items not retained by the Owner shall be disposed of off site by the Contractor.

3.18.1 Disposal of Demolished Materials

A. General: Remove from site debris, rubbish, and other materials resulting from demolition operations. Pay all fees related to removal and dumping.

1. Remove and dispose of interior demolition debris only.
2. Burning of removed materials from demolished structures will not be permitted on site.

B. Removal:

Transport materials removed from demolished structures and dispose of off site.

3.18.2 Job Conditions

A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work. The drawings are schematic and provided as an aid in bidding. The contractor shall visit the site and determine the actual conditions prior to bidding.

B. Partial Removal: Items of salvable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed. Storage or sale of removed items on site will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.

D. Protections: Ensure safe passage of persons around or through area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons. Install temporary electrical services, lighting, etc., as required by the Owner or authorities having jurisdiction.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.

F. Utility and Building Services: Maintain existing utilities and building services indicated to remain, keep in service, and protect against damage during demolition operations. Allow no interruption in service unless coordinated with owner at least 24 hours in advance.

1. Do not interrupt existing utilities and/or services serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction (Owner). Provide temporary services during interruptions to existing facilities, as acceptable to governing authorities (Owner).
2. Contractor will disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.

G. If Contractor is required to disconnect utility services or other services to an occupied area the Contractor shall provide temporary or alternative service to that area.

3.19 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.

3.20 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

Section 26 05 19

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

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 of 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

Section 26 05 26

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

Section 26 05 29

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. Josyln 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

Section 26 05 33

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 SURFACE METAL RACEWAY

A. Manufacturers:

1. Walker/Wiremold
2. Square D
3. Mono-Systems, Inc.

B. Description: One piece surface steel raceway suitable for surface mounting in dry locations. Provide raceway with interlocking base and cover construction. Finish shall be pre-painted scratch-resistant suitable for over-painting.

C. Knockouts: Manufacturer's standard.

D. Size: Provide Wiremold V2000 and V500 or as indicated on the Drawings. Finish to be approved by architect.

E. Supports: Provide support clips at intervals as recommended by the manufacturer. Adhesive applied raceways are not allowed.

F. Fittings: Provide surface raceway fittings as required for devices specified on the Drawings. Provide dividers for combination power and systems raceways.

G. Provide device outlets as indicated on the Drawings.

2.03 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 locknutted 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

Section 26 05 48

VIBRATION AND SEISMIC CONTROLS
FOR ELECTRICAL SYSTEMS

PART ONE - GENERAL

1.01 SECTION INCLUDES

A. Seismic Requirements for single rod hanger supports for conduit, pipe and other similar systems.

B. Seismic Requirements for trapeze type supports for cable tray, conduit, pipe and other similar systems.

1.02 REFERENCES

A. International Building Code (IBC), Latest Edition

B. Cooper B-Line SRS-02 – Seismic Restraints: Multi-Directional Bracing for Electrical Conduit, Cable Tray, and Mechanical Piping Systems.

C. ANSI/NFPA 70 – National Fire Protection Association (National Electrical Code)

1.03 QUALITY ASSURANCE

A. General:

1. The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.

B. Manufacturer:

1. System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.
2. Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

C. Installer: Company experienced in performing the work of this Section.

1.04 SUBMITTALS

A. Submit seismic force level (*Fp*) calculations from applicable building code. Submit pre-approved restraint selections and installation details from Cooper B-Line's Seismic Restraints catalog (SRS-02). [or engineer approved equal]

B. Restraint selection and installation details shall be pre-approved by a professionally licensed engineer experienced in seismic restraint design.

C. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (S_X) and Moment of Inertia (I_X).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver strut systems, pipe hangers and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

B. Store strut systems, pipe hangers and components in original cartons and in clean dry space; protect from weather and construction traffic.

PART TWO - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, strut systems, pipe hangers, and accessories to be installed shall be as manufactured by Cooper B-Line, Inc.

2.02 SEISMIC BRACING COMPONENTS

A. Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs indicated. A material heat code, part number, and manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.

1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33
2. Material for pre-galvanized strut: ASTM A653, SS, Gr. 33
3. Material for Hot-Dip Galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
4. Material for fittings and accessories: ASTM A907 Gr. 33, Structural Quality or ASTM A1011, SS. Gr.33.
5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.03 CODE INFORMATION

A. This project is subject to the seismic bracing requirements of the International Building Code, latest edition. The following criteria are applicable to this project.

1. Seismic Use Group (Table 1604.5): II
2. Site Class Category (Table 1615.1.1): D
3. Seismic Design Category (Table 1616.3(1)): D
4. Seismic Importance Factor 1.5

B. Forces shall be calculated for the above requirements and Equation 16-67, 68, & 69 in section 1621.1.4, unless exempted by 1621.1.1.

2.04 SEISMIC BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS

A. General:

1. Seismic restraint designer shall coordinate all attachments with the structural engineer of record.
2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
4. All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 3.01.

B. Friction from gravity loads shall not be considered resistance to seismic forces.

C. Fire protection systems shall meet the requirements of NFPA-13 and NFPA-14 for the building seismic requirements.

PART THREE - EXECUTION

3.01 INSTALLATION

A. Seismic Restraint of Piping:

1. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.
2. Transverse piping restraints shall be at 40-foot maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
3. Longitudinal restraints shall be at 80-foot maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
4. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24-inches of the elbow or tee or combined stresses are within allowable limits at longer distances.
5. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints.
6. Branch lines may not be used to restrain main lines.
7. Provide reinforced clevis bolts when required.

8. Piping crossing building seismic or expansion joints, passing from building to building, or supported from different portions of the building shall be installed to allow differential support displacements without damaging the pipe, equipment connections, or support connections. Pipe offsets, loops, anchors, and guides shall be installed as required to provide specified motion capability and limit motion of adjacent piping.
9. Do not brace a system to two independent structures such as ceiling and wall.
10. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

B. Seismic Restraint of Electrical Services

1. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.
2. Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
3. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
4. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building unless isolation is not specified.
5. Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
6. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.
7. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.
8. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
9. Provide reinforced clevis bolts where required.
10. Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.
11. Do not brace a system to two independent structures such as a ceiling and wall.
12. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

END OF SECTION

Section 26 05 53

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 then 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:

PANEL A 225A, 120/208V, 3P, 4W

CU-1 FED FROM PANEL E

8. Provide available fault current stickers/labels as required by NFPA.

END OF SECTION

Section 26 09 23

OCCUPANCY SENSORS

PART ONE - GENERAL

1.01 WORK INCLUDED

A. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.

B. Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 26.

C. Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to wiring, conduit, fixtures, HVAC systems and building management systems.

1.02 EQUIPMENT QUALIFICATION

A. Products supplied shall be from a single manufacturer that has been continuously involved in manufacturing of occupancy sensors for a minimum of five (5) years. Mixing of manufacturers shall not be allowed.

B. All components shall be U.L. listed, offer a five (5) year warranty and meet all state and local applicable code requirements.

C. Products shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%.

D. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.

1.03 SYSTEM DESCRIPTION

A. The objective of this section is to ensure the proper installation of the occupancy sensor based lighting control system so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.

B. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.

C. Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with specifications. The supplier's obligation shall include repair or replacement, and testing without charge to the owner, all or any parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

1.04 SUBMITTALS

A. Manufacturer shall substantiate conformance to this specification by supplying the necessary documents, performance data and wiring diagrams. Any deviations to this specification must be clearly stated by letter and submitted.

B. Submit a lighting plan clearly marked by manufacturer showing proper product, location and orientation of each sensor.

C. Submit any interconnection diagrams per major subsystem showing proper wiring.

D. Submit standard catalog literature which includes performance specifications indicating compliance to the specification.

E. Catalog sheets must clearly state any load restrictions when used with electronic ballasts.

1.05 SYSTEM OPERATION

A. It shall be the contractor's responsibility to make all proper adjustments to assure owner's satisfaction with the occupancy system, or;

B. Factory Startup: It shall be the manufacturer's responsibility to verify all proper adjustments and train owner's personnel to ensure owner's satisfaction with the occupancy system. This service is provided at an additional cost.

PART TWO - SPECIFIC REQUIREMENTS

2.01 ACCEPTABLE MANUFACTURERS

A. Watt Stopper, Cooper Greengate, or System Sensor.

B. The listing of any manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for sensors which meet or exceed the specifications included herein.

2.02 PRODUCTS

A. All products shall be Watt Stopper product numbers:

1. Ceiling sensors: WT-605, WT-600, WT-1105, WT-1100, WT-2205, WT-2200, WT-2250, WT-2255, WP-605, WP-1105, WP-2255, WP-2205, W-500A, W-1000A, W-2000A, W-2000H, UT-300, UT-305, UT-355, WPIR, DT-200, DT-205, DT-300, DT-305, DT-355, CX-100, CX-105, CI-200, CI-205, CI-300, CI-305, CI-355, CI-12, CI-24
2. Wall switch sensors: PW-100, PW-100-24, PW-200, WS-200, WD-170, WD-180, WD-270, WD-280, WN-100-120, WN-100-277, UW-100, UW-100-24, UW-200, DW-100, DW-100-24, DW-200.
3. Power and Auxiliary Packs: BZ-50, BZ-100, BZ-150, LC-100, C120E-P, C277E-P, S120/27-P, AT-120, AT-277
4. Digital Time Switches: TS-400, TS-400-24
5. Automatic Control Switch: AS-100

B. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.

C. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180˚ coverage capability.

D. Wall switch products shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.

E. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.

F. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.

G. Where specified, vandal resistant wall switch sensors shall utilize a hard lens with a minimum 1.0mm thickness. Products utilizing a soft lens will not be considered.

H. Passive infrared sensors shall utilize Pulse Count Processing and Detection Signature Processing to respond only to those signals caused by human motion.

I. Passive infrared sensors shall provide high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line).

J. Passive infrared sensors shall have a multiple segmented Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.

K. Where specified, passive infrared ultrasonic and dual technology sensors shall offer daylighting footcandle adjustment control and be able to accommodate dual level lighting.

L. Dual technology sensors shall be wall mounted, corner mounted or ceiling mounted in such a way as to minimize coverage in unwanted areas.

M. Dual technology sensors shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.

N Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.

O. Ultrasonic operating frequency shall be crystal controlled at 25 kHz within ± 0.005% tolerance, 32 kHz within ± 0.002% tolerance, or 40 kHz ± 0.002% tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.

P. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.

Q. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

R. When specified, sensors shall utilize SmartSet™ technology for automatically adjustable time delay and sensitivity settings.

S. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.

T. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.

U. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

V. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

W. All sensors shall have UL rated, 94V-0 plastic enclosures.

2.03 CIRCUIT CONTROL HARDWARE - CU

A. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.

B. Relay Contacts shall have ratings of:
13A - 120 VAC Tungsten
20A - 120 VAC Ballast
20A - 277 VAC Ballast

C. Control wiring between sensors and controls units shall be Class II , 18-24 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

D. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

PART THREE - EXECUTION

3.01 INSTALLATION

A. It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.

B. It is the contractor’s responsibility to arrange a pre-installation meeting with manufacturer's factory authorized representative, at owner's facility, to verify placement of sensors and installation criteria.

C. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

END OF SECTION

Section 26 24 16

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. General Electric Company
3. 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

Section 26 27 26

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.

3. Commercial Specification Grade Duplex Isolated Ground: Provide duplex commercial specification grade type receptacles, 2-pole, 3-wire grounding, isolated ground connection 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. Provide Hubbell IG5362.

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, Isolated ground, Leviton 5362-IG* w/ engraved "Isolated Ground"

Receptacle, surge suppressor, Leviton 5380-* or 5380IG
Receptacle, commercial grade, tamper-resistant, 5362-SG*
Receptacle, commercial grade, GFCI, tamper Resistant, G5362-WT*
Receptacle, hospital grade, tamper-resistant, 8300-SG*
Receptacle, hospital grade, GFCI, tamper resistant, GFWT2-HG*
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 coverplates 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 coverplates throughout project shall be of the same material, color, finish and design and shall match any existing device coverplates 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

Section 26 28 16

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. General Electric Company
   c. 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 Instantaneous Pickup
    b. Long Time Delay
    c. Short Time Pickup
    d. Short Time Delay
    e. Ground Fault Pickup – If indicated on the Drawings
    f. 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

Section 26 29 13

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. General Electric Co.
3. 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

Section 26 43 13

SURGE PROTECTION FOR
ELECTRICAL POWER CIRCUITS

PART ONE – GENERAL

1.1 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for surge protection for low voltage electrical power circuits as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:

1. Requirements for both field-mounted SPDs (externally mounted), and integrated SPDs (installed from the factory) for low voltage power distribution and control equipment.

1.2 REFERENCES

A. General: 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. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. ANSI/IEEE C62.41.1, “Guide on the Surges Environment in Low Voltage (1000 V and Less) AC Power Circuits.”
2. ANSI/IEEE C62.41.2, “Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits.”
3. ANSI/IEEE C62.45, “Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.”

C. International Organization for Standardization (ISO):

1. ISO 9001, “Quality Management Systems – Requirements.”

D. National Fire Protection Association (NFPA):

1. NFPA 70, “National Electrical Code,” hereinafter referred to as NEC.

E. Underwriters Laboratories, Inc. (UL):

1. UL 67, “Standard for Panelboards.”

2. UL 96A, "Standard for Installation Requirements for Lightning Protection Systems."
3. UL 845, “Motor Control Centers.”
4. UL 857, “Busways.”
5. UL 891, “Switchboards.”
6. UL 1283, “Standard for Safety for Electromagnetic Interference Filters.”
7. UL 1449, “Standard for Surge Protective Devices.”
8. UL 1558, “Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear.”

1.3 DEFINITIONS

A. $I_{(n)}$: Nominal discharge current rating.

B. MCOV: Maximum continuous operating voltage.

C. Protection Modes: The pair of electrical connections where the VPR applies.

D. MOV: Metal oxide varistor; an electronic component with a significant non-ohmic current voltage characteristic.

E. OCPD: Overcurrent protective device.

F. SCCR: Short circuit current rating.

G. SPD: Surge protective device.

H. VPR: Voltage protection rating.

1.4 SYSTEM DESCRIPTION

A. General SPD Requirements:

1. SPD with accessories shall be listed and labeled as defined in NEC, by UL, and marked for intended location and application.
2. Comply with UL 1449.
3. Comply with UL 1283 (applies to Type 2 SPDs).
4. Design in accordance with ANSI/IEEE C62.41.1, ANSI/IEEE C62.41.2, and ANSI/IEEE C62.45.
5. SPDs manufacturer shall be ISO 9001 certified.
6. MCOV of the SPD shall not be less than 115 percent for 480Y/277V and 125 percent for 208Y/120V nominal RMS system voltages.
7. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment. The equipment shall be fully tested and certified to the following UL standards:
   a. Panelboards: UL 67.
   b. Motor Control Centers: UL 845.
   c. Busway: UL 857.
   d. Switchboards: UL 891.
   e. Switchgear: UL 1558.

1.5 SUBMITTALS

A. General: See Section 01 33 23 – Shop Drawings, Product Data & Samples

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.

1. For each type of product indicated include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Provide verification the SPD is listed or recognized through UL to the latest safety standard, UL 1449.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data.

D. Operation and Maintenance Data: Submit operation and maintenance data for surge protection for low voltage electrical power circuits to include in operation and maintenance manuals.

E. Warranty Data: Submit Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of surge protection for low voltage electrical power circuits of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.
2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing surge protection for low voltage electrical power circuits similar in type and scope to that required for this Project and shall be approved by the manufacturer.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Single Source Responsibility: Obtain surge protection for low voltage electrical power circuits and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 WARRANTY

A. General: See Section 01 77 19 – Contract Closeout.

B. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace surge protection for low voltage electrical power circuits that fail in materials or workmanship within the specified warranty period.

1. Warranty Period: Warranty period shall be 10 years from date of Substantial Completion.

PART TWO – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Product specified is "Surgelogic Surge Protection" as manufactured by Square D by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other specified gear manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2.2 SERVICE ENTRANCE SUPPRESSORS

A. SPDs: Comply with UL 1449.

1. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the service entrance OCPD shall be either Type 1 or Type 2 SPDs.
2. Type 2 SPDs shall also comply with UL 1283.

B. Features and Accessories: SPDs shall provide the following features and accessories:

1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.
2. Indicator light(s) display for power and protection status with push-to-test capabilities.
3. Audible alarm with silencing switch.
4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
5. Surge counter with reset switch.
6. Provide integral disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.

C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
C	Service Entrance	240 kA	120 kA
B	Distribution	160 kA	80 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	800 volts	1200 volts	1500 volts
L-L	1200 volts	2000 volts	2500 volts

2. UL 1449 VPR for Delta configured circuits shall not exceed the following:

Modes	240D	480D	600D
L-G; N-G	1200 volts	2000 volts	2500 volts

E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.

F. Nominal Discharge Current Rating: 20kA $I_{(n)}$.

1. Surge protective devices located at service entrance locations shall carry a minimum nominal discharge current rating of 20 kA to meet the requirements of UL 96A.

2.3 DISTRIBUTION/ BRANCH PANEL SUPPRESSORS

A. SPDs: Comply with UL 1449

1. Type 1 or Type 2 SPDs.
2. Type 2 SPDs shall also comply with UL 1283.

B. Features and Accessories: SPDs shall provide the following features and accessories:

1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.
2. Indicator light(s) display for power and protection status.

3. Audible alarm with silencing switch.
4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
5. Surge counter with reset switch.
6. Optional integral disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.

C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
B	Distribution	160 kA	80 kA
B	Branch	120 kA	60 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	800 volts	1200 volts	1500 volts
L-L	1200 volts	2000 volts	2500 volts

2. UL 1449 VPR for Delta configured circuits shall not exceed the following:

Modes	240D	480D	600D
L-G; N-G	1200 volts	2000 volts	2500 volts

E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.

F. Nominal Discharge Current Rating: 10 kA $I_{(n)}$.

2.4 ENCLOSURES

A. Enclosure shall meet or exceed the ratings for the environment to be installed as indicated on drawings.

1. Indoor Enclosures for Externally Mounted SPDs: NEMA 250, Type 1R.

2. Outdoor Enclosures for Externally Mounted SPDs: NEMA 250, Type 3R, 4X.

PART THREE – EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 INSTALLATION

A. Install surge protection for low voltage electrical power circuits in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the drawings.

B. Install SPD devices at the service entrance in accordance with NEC. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the OCPD shall be either Type 1 or Type 2 SPDs.

C. Follow manufacturer's recommended installation practices.

1. Provide a minimum 30 ampere circuit breaker as a dedicated disconnecting means for the SPD unless otherwise indicated.
2. Install SPDs with properly rated conductors between suppressor and points of attachment as short and straight as possible; adjust circuit breaker positions to achieve shortest and straightest leads.
3. Do not splice and extend SPD leads unless specifically permitted by manufacturer.
4. Twist input conductors together to reduce the input inductance.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Compare equipment nameplate data for compliance with the Drawings and the Specifications.

2. Inspect anchorage, alignment, grounding, and clearances.

3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. A SPD will be considered defective if it does not pass inspections.

C. Prepare inspection reports.

3.4 DEMONSTRATION

A. Start-Up Service:

1. Complete start-up checks according to manufacturer's written instructions.
2. Do not perform insulation resistance tests of the distribution wiring equipment with SPDs installed. Disconnect all wires, including, but not limited to, neutral of the SPD before conducting insulation resistance tests, and reconnect them immediately after the testing is over.
3. Energize SPDs after power system has been energized, stabilized, and tested.

3.5 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the surge protection for low voltage electrical power circuits shall be without damage at time of Substantial Completion.

END OF SECTION

Section 26 51 00

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. TM-21-11 (or latest) – IES Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources.

D. NEMA SSL 1-2010 (or latest) – Electronic Drivers for LED Devices, Arrays, or Systems.

1.4 SUBMITTALS

A. Include outline drawings, lamp and ballast 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 EXTRA MATERIALS

A. Provide one (1) LED driver or ballast of each type.

1.7 DEFINITIONS

A. Driver: The power supply used to power LED luminaires, modules, or arrays.

B. L70, $L_{70,}$ or $L_{70\%}$: 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 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 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 ≤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.

2.3 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 ≤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. High-Bay or Low-Bay Luminaires: Use power hook hangers rated 500 pounds (225 kg) minimum and provide safety chain between ballast and structure. Also provide safety chain between reflector and ballast.

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.

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. Controls shall be compatible with the luminaires/ballasts/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

Section 26 56 00

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. TM-21-11 (or latest) – IES Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources.

E. 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, $L_{70,}$ 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 ≤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.

2.3 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 ≤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 all concrete foundations for poles, bollards, and ground-mounted flood and accent lighting.

B. Construct from reinforced concrete in sizes to meet the minimum structural requirements of IBC 1807 for Posts and Poles and/or as designed by a licensed Structural Engineer in State of Installation.

C. 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.

D. 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.

E. The exposed surface area of the foundation shall have the forms removed and the concrete rubbed out to a smooth finish.

F. Pole Base J-Boxes:

1. For pole bases above grade 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.

3.4 CLEANING

A. Clean photometric control surfaces.

B. Clean finishes and touch up damage.

END OF SECTION

Section 27 05 00

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 two - 2" 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.

B. TTB – Telecom Terminal Board: 4 feet by 8 feet, or size as indicated, by 3/4 inch plywood terminal board painted flat white (where indicated on the plans).

C. Provide ground bar equivalent to Square D #PK9GTA at each TTB. The terminal board ground bars shall be bonded to building steel and to the main electrical service panel by a #6 ground wire. Satellite terminal board ground bars shall be bonded to building steel and to the main terminal board ground bar.

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.

END OF SECTION

Section 31 11 00

CLEARING AND GRUBBING

PART ONE - GENERAL

1.1 WORK INCLUDED

1. Removing and disposing of existing trees, vegetation, fencing, buildings, asphalt, concrete, etc. as shown on the drawings.
2. Preserving trees and vegetation in designated areas.
3. Disposing of removed material.

1.2 RELATED WORK

1. Grading Section 31 22 00

PART TWO - PRODUCTS

No products included.

PART THREE - EXECUTION

3.1 PREPARATION

A. Protect existing trees from damage by equipment when removing designated trees and during site grading operation.

B. Mark clearly the areas of preserved vegetation, the clearing limits along the boundary of the site, and the individual trees to be saved as designated by the Architects and/or Drawings.

3.2 CLEARING

A. Clear the site within the limits of proposed improvements as shown on the Drawings, of trees, saplings, brush, shrubs, roots, undergrowth, buildings, fencing, pavements, sidewalks, utilities, storm drains, and other debris.

B. Remove stumps from building, paving, and embankment areas.

1. Remove all stumps in building and paving areas.
2. Cut stumps in other areas flush with or below existing ground elevations.
3. Backfill and compact stump holes and foundation holes except in areas to be excavated.

C. Backfill holes within the building area using suitable fill materials as defined in Paragraph 2.1 of Section 31 22 00. Fill shall be compacted according to the requirements of Paragraph 3.3 of Section 31 22 00.

D. Do not park or service equipment under the branches of trees designated to remain.

E. Restrict movement and operation of equipment so that trunks, branches and roots of trees and shrubs designated to remain will not be broken, scarred, or otherwise damaged.

F. Apply an approved tree wound paint to any lightly damaged trees.

3.3 DISPOSAL

A. Dispose of cleared materials at an offsite location secured by the Contractor.

3.4 PROTECTION

A. Erect temporary barricades, and other protection required to protect all persons and property from preparation and construction operations.

3.5 UTILITIES

A. Protect and preserve in operating condition, all active utility services that traverse or border the site, and repair any damages that may occur to these services due to work performed the site preparation, demolition and construction operations. Utility lines that are to be abandoned shall be completely removed from the site and plugged at the street as required by the serving utility.

END OF SECTION

Section 31 22 00

GRADING

PART ONE - GENERAL

1.1 WORK INCLUDED

A. Stripping and stockpiling surface layer of topsoil and organic matter in building and traffic areas and in all cut and fill areas.

B. Removing and disposing of boulders, fractured rock, and other material unsuitable for use in fill under structures (controlled fill).

C. Excavating site to required subgrade for controlled fill and traffic areas and grading site to required slopes.

D. Placing and compacting excavated material to required density and at required subgrade and slope for structures, pavement areas, and fill slopes.

1.2 RELATED WORK

A. Testing Laboratory Services Section 01 45 29

1.3 QUALITY ASSURANCE

A. Testing agency:

1. Soil classification tests on material for controlled fill to be performed by testing laboratory selected by the Architect.
2. In-place soil compaction tests to be performed by testing laboratory at locations selected by the Architect.
3. Refer to section 01 45 29 - Testing Laboratory Services for details of testing procedures.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):
   a. ASTM D2487-69 (175), Classification of Soils for Engineering Purposes.
   b. ASTM D-1557 Modified Compaction Procedures.
   c. ASTM D 1556-64 (1974) Method of Test for Density of Soil in Place by the Sand-cone Method.
   d. ASTM D 2167-66 (1977), Method of Test for Density of Soil in Place by the Rubber Balloon Method.
   e. ASTM D 2922-71, Methods for Determining the Density of Soil and Soil-aggregate by Nuclear Methods (shallow depth).

1.4 SUBMITTALS

A. Have the testing laboratory submit reports that material for controlled fill meets the requirements of this Section:

1. On site excavated material.
2. Borrow material.

B. Have testing laboratory submit reports of density tests of controlled fill.

1.5 SITE CONDITIONS

A. Establish positive surface drainage during and following clearing and site grading by proper ditching or sloping.

B. Provide measures to prevent mud and silt from flowing onto adjacent property.

C. Erect sheeting, shoring, and bracing as necessary for protection of persons, improvements, and excavation.

PART TWO - PRODUCTS

2.1 SUITABLE MATERIAL FOR CONTROLLED FILL

A. On site excavated soils:

1. Sandy or gravelly clays having a liquid limit less than 40.
2. Unified Soils Classification System Soils:
   a. Class SC, SW, SM
   b. Class GC, GW, GM
   c. Class CL (when approved by Soils Engineer).
3. Overburden soils with low plasticity.

B. Borrow Material:

1. Material meeting the requirements of selected material as described in Section 210 of the Arkansas State Highway Department's Standard Specifications for Highway Construction, Edition of 2003.
2. All borrow material shall be approved by the soils engineer prior to placement.

2.2 UNSUITABLE MATERIAL FOR CONTROLLED FILL

A. All areas: Organic top soils and soils containing roots, vegetable matter, or trash.

B. Building area:

1. Cobbles, boulders, and fractured rock more than 6 inches in greatest dimension anywhere in the fill.
2. Cobbles and fractured rock more than 3 inches in greatest dimension within 12 inches of the finished subgrade.

C. Paving area:

1. Cobbles, boulders, and fractured rock more than 8 inches in greatest dimension anywhere under the paving area.
2. Cobbles and fractured rock more than 4 inches in greatest dimension within 12 inches of the finished subgrade.

2.3 SUITABLE MATERIAL FOR CLEAN SAND OR GRAVEL UNDER SLABS (DRAINAGE FILL)

A. All materials clean free of shale, clay, friable materials and debris.

1. Gravel: Clean natural stone, free of organic material. Maximum size 1/2".
2. Sand: Clean natural river or bank sand, free of organic material.

PART THREE - EXECUTION

3.1 PREPARATION

A. Complete clearing work:

1. Remove unsuitable materials from the site before beginning site grading.

B.. Stake the work: By the Contractor.

C. Notify Architect 24 hours before controlled fill is to begin.

3.2 EXCAVATION

A. Excavation procedures:

1. Strip surface layer of top soil, organic matter, and any remaining trash in cut and fill areas of the site and stockpile for later use in landscaping operations.
   a. Removed material containing unacceptable quantities of trash or rock in the mixture shall be disposed of off the site or may be spread in thin layers in the outerpart of fill slopes outside of controlled fill areas.
2. Remove soft or spongy material at the exposed subgrade of cut and fill areas and replace with approved material and compact.
3. Remove rock and boulders in cut areas to a minimum depth of 8 inches below sub-grade and replace with approved material and compact.
4. Use all suitable excavated material, as far as practicable, in the formation of controlled fills and fill slopes.
5. Material determined by the Soils Engineer to be unsuitable for proper compaction may be placed in the fill slopes outside controlled fill areas.
6. Excavated boulders and rock determined by the Soils Engineer to be too large for use in fill slopes shall be disposed of off the site.
7. Do not leave undrained pockets where boulders or rocks have been removed.
8. Keep all excavation dry by pumping or draining water from the Work.
9. In cut areas where fill is not required, scarify exposed subgrade soils to a depth of at least 8 inches, adjust the soil moisture, and recompact to the same density as required for each layer of controlled fill; or, proof-roll the areas with a loaded tandem axle dump truck or similar equipment to aid in identifying soft areas.

10. Grade excavated slopes to a neat, smooth condition with no loose material or scars left on the surface.
11. Refer to the geotechnical investigation for further information regarding excavation, site preparation, fill placement, etc.

3.3 CONTROLLED FILL

A. Scarify cleared surfaces in fill areas to a depth of at least 8 inches, adjust the soil moisture, and re-compact to the same density as required for each layer of controlled fill; or proof-roll as described in sub-paragraph 9 of Article 3.2.1.

B. Fill placed on hillsides:

1. Bench continuously as the work is brought up in layers.
2. Begin each horizontal cut at the intersection of the original ground and the vertical sides of the previous cuts.
3. Re-compact the cut-out material along with the new fill material.

C. Place fill material in lifts no greater than 8 inch loose-lift uniform thickness and compact to a minimum of 95% of maximum dry density at or near optimum moisture content as determined by the Modified Compaction Procedures, ASTM D-1557.

1. Compact lifts containing low plasticity clay soils at 2% to 4% above optimum moisture content.
2. Add water when the soil is too dry and mix with the material before compacting.
3. Aerate material when too wet by manipulation with suitable equipment before compacting.

D. Each fill lift will be tested and approved for adequate density and proper moisture content before additional lifts shall be placed.

E. Grade fill slopes to a neat, smooth condition with no loose material, protruding rock, or scars left on the surface.

3.4 FIELD QUALITY CONTROL

A. In-place tests of density and moisture content of controlled fill in accordance with either ASTM D1556-64 (1974), ASTM D2167-66 (1977), or ASTM D2922-71 (1976) by testing laboratory.

B. Soil Classification of fill material and placement location of each type to be determined by Soils Engineer.

C. Provide a minimum of 2 tests of density and moisture content per lift.

END OF SECTION

Section 31 23 00

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.	Testing Laboratory Services	Section 01 45 29
B.	Clearing and Grubbing	Section 31 11 00
C.	Grading	Section 31 22 00
D.	Seeding	Section 32 92 19
E.	Concrete	Division Three

1.3 BACKFILL COMPACTION TESTING

A. Testing of compacted backfill materials will be performed by an independent testing laboratory employed and paid for by the Owner. Testing will be performed so as to least encumber the performance of Work. Refer to Section 01 45 29.

B. When work of this Section or portions of work are completed, notify the testing laboratory to perform density tests. Do not proceed with additional backfill work until results have been verified.

C. If, during progress of work, tests indicate that compacted materials do not meet specified requirements, remove defective work, replace, and retest at no cost to Owner, as directed by the Architect.

D. Ensure compacted fills are tested before proceeding with placement of surface materials.

1.4 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 structures and backfill under paving areas: Compact to top of subgrade to density requirements specified in Section 31 22 00, Article 3.3.

D. Fill under landscaped areas: Sub-soil to within 12 inches of finish grade elevation.

3.6 FIELD QUALITY CONTROL

A. In-place tests of density and moisture content of backfill specified to be compacted to specific density requirements shall be performed by the testing laboratory in accordance with either ASTM D1556-64 (1974), ASTM D2167-66 (1977), or ASTM D2922-71 (1976).

END OF SECTION

Section 31 25 00

EROSION AND
SEDIMENTATION CONTROL

PART ONE – GENERAL

1.1 DESCRIPTION

A. All new slopes and disturbed areas shall be treated for erosion control in accordance with these specifications including silt fencing and placement of hay bales. Contractor will provide a Storm Water Pollution Prevention Plan (SWPPP) and permit complying with all Arkansas Department of Environmental Quality Standards.

1.2 RELATED SECTIONS

A. Clearing and Grubbing Section 31 11 00

B. Grading Section 31 22 00

1.3 REFERENCES

A. United States Environmental Protection Agency (EPA):

1. NPDES – National Pollutant Discharge Elimination System

B. Arkansas Highway & Transportation Department (AHTD):

1. AHTD – Arkansas Highway & Transportation Department Standard Specifications for Highway Construction.

C. Arkansas Department of Environmental Quality (ADEQ):

1. ADEQ – Arkansas Department of Environmental Quality requirements.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the following ADEQ standards:

1. Section 220 – Temporary Erosion, Sedimentation and Stormwater Pollution Prevention and Control.
2. Section 223 – Temporary Silt Fence.
3. Section 224 – Temporary Sediment Control Filters.
4. Section 226 – Temporary Sediment Removal.

B. Regulatory Requirements: Conform to requirements of local authority having jurisdiction for prevention of erosion and sediment control.

1. Conform to NPDES requirements where required.

1.5 PROJECT CONDITIONS

A. Protect adjacent properties and water resources from erosion and sediment damage throughout work. Take all necessary measures to prevent sedimentation from construction operations to enter adjacent property. Offsite discharge of sedimentation is not permitted.

PART TWO – PRODUCTS

2.1 MATERIALS

A. Seeding: Bermuda Grass, common, unhulled, (March 1st through September 1st) broadcast at a rate of 30 pounds per acre. All other times, seed shall be Rye applied at the rate of 20 pounds per acre and unhulled Bermuda at 20 pounds per acre.

B. Fertilizer: 10-20-10 spread at the rate of 400 pounds per acre.

C. Fencing for Siltation Control: UV resistant geotextile fabric.

D. Temporary Mulches: Loose straw, netting, wood cellulose, or agricultural silage free of seed. Mulch material with asphalt tack shall be spread as required to hold grass during establishment of turf.

E. Bale Stakes:

1. Minimum 3 feet length.
2. (2) No. 4 steel reinforcing bars or
3. (2) steel pickets or
4. (2) 2 x 2 inch hardwood stakes driven 18 inches to 24 inches into ground.

PART THREE – EXECUTION

3.1 The Contractor shall produce a Storm Water Pollution Prevention Plan (SWPP) that meets the requirements set forth by the Arkansas Department of Environmental Quality.

3.2 The Contractor shall fill our inspection reports and log rainfall data as required by the SWPP.

3.3 The Contractor shall install all erosion control measures prior to commencing dirtwork activities on this site.

3.4 The Contractor shall immediately clean up any sediment that leaves this site.

3.5 The Contractor shall re-establish all disturbed areas in accordance with the SWPP.

3.6 The Contractor shall removal all erosion control measures once the site has been re-established.

END OF SECTION

Section 31 31 16

TERMITE CONTROL

PART ONE - GENERAL

1.1 WORK INCLUDED

A. Soil treatment under slabs for termite control.

B. Soil treatment at concrete foundation for termite control.

C. Termite damage guarantee with annually renewable termite inspection control contract.

1.2 RELATED WORK

A.	Excavation and Fill	Section 31 23 00
B.	Concrete Work	Division Three

1.3 QUALITY ASSURANCE

A. The applicator shall be licensed by the State of Arkansas to perform the Work of this Section.

B. The applicator shall be bonded and insured by an insurance company authorized to practice business in the State of Arkansas.

1.4 REGULATORY REQUIREMENTS

A. Local Laws: All Work performed under this Section shall conform with the Arkansas Pest Control Law, Act III of 1965.

1.5 GUARANTEE

A. Submit a five year written guarantee, without monetary limits, stating that all additional treatment of areas where termites appear, and any damages caused by the termite appearance, will be performed at no cost to the Owner.

B. Provide the Owner an annually renewable termite inspection control contract, effective five years from date of the original soil treatment, to assure necessary re-treatment and liability for termite damage.

C. Draw the guarantee in favor of the Owner, with copies of the guarantee of the renewable inspection control contract provided for the Owner, the Contractor, and the Architect.

D. No payment will be made for termite control work until the above guarantee has been submitted in satisfactory form.

PART TWO - PRODUCTS

2.1 MATERIALS

A. Chemicals:

1. Use chemicals formulated as an emulsible concentrate for subsequent dilution with water.
2. Fuel oil will not be permitted as a diluent.
3. Use chemicals of a type currently known to give insurable protection for the soil and fill at the foundation and under the new addition.

PART THREE - EXECUTION

3.1 PREPARATION

A. The applicator shall visit the job site to determine the soil texture or otherwise obtain the information from the County Agent, the U.S. Soil Conservation Service, or other approved authorities.

B. The Contractor shall remove all wood and other cellulose containing materials from the area within the building walls before the solution is applied.

C. The Contractor shall set tentative dates with the applicator for initial treatment services and schedule subsequent service as deemed necessary for completion of the termite control work.

D. The Contractor shall give the applicator 24 hour notice prior to installing the moisture barrier in preparation for placement of the floor slabs.

3.2 APPLICATION

A. Soil Conditions:

1. Do not apply the working solution when soil is frozen, excessively wet, or immediately after heavy rains.
2. Do not disturb treated areas during subsequent construction operations.

B. Apply the working solution to the soil over the entire surface under slabs and at the concrete foundations at the rate of application recommended by the chemicals manufacturers and in accordance with regulatory requirements to provide the required guarantee.

C. If after an area has been treated and before the General Contractor can pour the concrete slab, it should rain, the entire area shall be retreated, without additional cost to the Owner. No more area than will be covered with slab shall be treated at one time.

END OF SECTION

Section 32 12 16

ASPHALTIC PAVING

PART ONE - GENERAL

1.1 WORK INCLUDED

A. Project Description:

1. Prepare sub-grade to receive base course.
2. Provide compacted base course.
3. Place asphaltic concrete hot mix (ACHM) surface course.
4. Repair existing paving following placement of utility line crossings and new culverts.
5. Sawcut all intersections of existing and new paving.

1.2 RELATED WORK

A.	Testing Laboratory Services	Section 01 45 29
B.	Grading	Section 31 22 00

1.3 REFERENCE STANDARDS

A. Arkansas Highway and Transportation Dept. (AHTD).

B. American Society for Testing and Materials (ASTM).

1. ASTM D1557-70, Test for Moisture - Density Relationship of Soils using 10 lb. (4.5 kg) rammer in 18 inch (457 mm) drop.
2. ASTM D2922-78, Methods for Determining the Density of Soil and Soil Aggregate in Place by Nuclear Methods (shallow depth).
3. ASTM 3515-76, Specifications for Hot-Mixed, Hot- Laid, Bituminous Paving Mixtures.
4. ASTM D1074-76, Test for Compressive Strength of Bituminous Mixtures.

PART TWO - PRODUCTS

2.1 BASE COURSE MATERIALS

A. Crushed stone: SB-2, meeting the requirements of sub-section 303.02 of the AHTD Standard Specifications, or approved equal.

2.2 ASPHALT PAVEMENT MATERIALS

A. ACHM: Type 2 mix as described in Division 400 of the AHTD Standard Specifications.

B. The surface course shall be composed of a mixture of mineral aggregate and asphalt cement in the proportions by weight for the type mixture designated.

PART THREE - EXECUTION

3.1 PREPARATION

A. Sub-grade:

1. Ensure grading of the sub-grade to the required elevation.
2. Scarify to a depth of six inches the sub-grade where the base course is to be placed.
3. Water and thoroughly mix sub-grade where the base course is to be placed.
4. Water and thoroughly mix sub-grade until optimum moisture content exists. When excess of moisture exists, rework and aerate sub-grade until optimum moisture content is obtained.
5. Recompact the sub-grade to a minimum of 95% of the maximum dry density at or near the optimum moisture content as determined by ASTM D 1557.
6. Before final rolling, grade the entire area to the required cross section, adding additional sub-soil as required and compact the sub-grade surface to the required density.

3.2 PLACEMENT

A. Base Course:

1. Place the crushed stone base material over the prepared sub-grade in accordance with the construction methods described in sub-section 303 of the AHTD Standard Specifications. COMPACTED THICKNESS AS SHOWN ON PLANS.
2. Add water during compaction to bring the base course materials to optimum moisture content. When an excess moisture exists, rework the base course materials until optimum moisture content is obtained.
3. Compact the base course to 98% of the maximum dry density as determined by ASTM D 1557.

B. ACHM Surface Course:

1. Construction Methods: Division 400, AHTD Standard Specifications.
2. Temperature range of mix:
   a. When discharged from mixer: 285 degrees F to 325 degrees F.
   b. When placed on base course: 275 degrees F to 325 degrees F.
3. Temperature of air: Do not place ACHM when air temperature in the shade is below 40 degrees F.
4. Place asphalt pavement to COMPACTED DEPTH AS SHOWN ON PLANS.
5. Compact to required density, with approved rolling equipment. Start compaction as soon as pavement will bear equipment without checking or undue placement.
6. Required density: 92% of maximum theoretical density.
7. Carry out compaction in three operations in pass sequence. Ensure each pass of roller overlaps previous passes to ensure smooth surface free of roller marks. Keep roller wheels sufficiently moist so as not to pick up material.
8. Perform hand tamping in areas not accessible to rolling equipment.
9. Ensure joints made during paving operations and at connection to existing pavement are straight, clean vertical and free of broken or loose material. Prime vertical surfaces of joints to ensure tight bond.

10. Ensure surface of completed asphalt pavement is true to lines, profiles and elevations indicated, and is free from depressions exceeding 1/4 inch when measured with a 10 foot straight edge.
11. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature.

3.3 FIELD QUALITY CONTROL

A. Testing laboratory make in-place tests of density and moisture content of the sub-grade and the base course in accordance with ASTM D2922-78.

B. Testing laboratory make density tests of compacted asphalt paving in accordance with ASTM D1074-76.

C. Provide four inch wide white center line and parking bay markings as shown on the drawings.

END OF SECTION

Section 32 31 13

CHAIN LINK FENCES AND GATES

PART ONE - GENERAL

1.1 DESCRIPTION

A. Work included: All labor and material to complete all fencing, chain link, 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.

B. Related work described elsewhere:

1. Clearing and Grubbing Section 31 11 00
2. Grading Section 31 22 00

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-eights 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-eights 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

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 fences, gates and privacy slats 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

2.9 CHAIN LINK FENCE FABRIC

A. Polyolefin elastomer coating, thermally fused to zinc-coated steel core wire: Per ASTM F668 Class 2b.

B. 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

Section 32 31 19

DECORATIVE METAL FENCING SYSTEM

PART ONE – GENERAL

1.1 WORK INCLUDED

1.1.1 The contractor shall provide all labor, materials and appurtenances necessary for installation of the ornamental steel fence system including the aluminum gate at entry as defined herein for a complete installation.

1.2 QUALITY ASSURANCE

1.2.1 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.

1.2.2 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.

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 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.

1.3.3 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 REFERENCES

- ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM D523 - Test Method for Specular Gloss.
- ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.5 PRODUCT HANDLING AND STORAGE

1.5.1 Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART TWO – MATERIALS

2.1 SYSTEM DESCRIPTION

The manufacturer shall supply an ornamental steel fence system including the entry gate of the Ameristar® 7'0" Montage Commercial® Genesis™ design. The system shall include all components (i.e., pickets, rails, posts, gates and hardware) required.

2.2 MANUFACTURER

The fence and gate systems shall be as manufactured by Ameristar Fence Products, Inc. in Tulsa, Oklahoma.

2.3 MATERIAL

A. Steel:

1. Steel material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft^2 (276 g/m^2), Coating Designation G-90.
2. Material for pickets shall be 1" square x 14 Ga. tubing. The cross-sectional shape of the rails shall conform to the manufacturer's ForeRunner double wall design with outside cross-section dimensions of 1.75" square and a minimum thickness of 14 Ga. Picket holes in the ForeRunner rail shall be spaced 4.715" o.c., except for Invincible style 6' long, which shall be, spaced 4.98" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.4 FABRICATION

A. Steel:

1. Pickets, rails and posts shall be precut to specified lengths. ForeRunner rails shall be prepunched to accept pickets. Pickets shall be predrilled to accept retaining rods.

2. Grommets shall be inserted into the prepunched holes in the rails and pickets shall be inserted through the grommets so that predrilled picket holes align with the internal upper raceway of the ForeRunner rails (Note: This can best be accomplished by making an alignment jig). Retaining rods shall be inserted into each ForeRunner rail so that they pass through the predrilled holes in each picket.
3. The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.
4. Completed sections (i.e., panels) shall be capable of supporting a 600 lb. load applied at midspan without permanent deformation. Panels shall be adaptable to a 25% change in grade.
5. Swing and cantilever gates: Refer to drawings.
6. PVC Picket Panels: Installed between pickets as manufactured by Hurricane Manufacturing Co., Tulas, OK.
7. Gate operators: Max 1700 FS CS gate operators with magnetic limit sensors and heavy duty steel cover. Gate operator shall include Aeromax 200K keypad, programmed by Owner. Provide for complete system as shown on drawings.

PART THREE – EXECUTION

3.1 PREPARATION

3.1.1 All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 FENCE INSTALLATION

3.2.1 Fence post shall be spaced according to drawings. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.3 FENCE INSTALLATION MAINTENANCE

3.3.1 When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.4 GATE INSTALLATION

3.4.1 Gate posts shall be spaced according to the gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.5 CLEANING

3.5.1 The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

Section 32 92 19

SEEDING

PART ONE - GENERAL

1.1 WORK INCLUDED

A. Preparation of sub-grade

B. Placing topsoil

C. Seeding 10' around new building and areas disturbed by construction

D. Fertilizing and watering

E. Compacting disturbed gray gravel area that is not seeded

1.2 RELATED WORK

A.	Clearing and Grubbing	Section 31 11 00
B.	Grading	Section 31 22 00
C.	Excavation and Fill	Section 31 23 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

Section 32 92 23

SODDING

PART ONE – GENERAL

1.1 DESCRIPTION:

A. Work included: Prepare the rough grade and furnish and place topsoil, fertilizer, and sod in areas where shown and called for on the Drawings. Maintain growth of the turf during the contract period.

B. Reference Documents: Reference in this section to Codes, Federal Specifications, ASTM Standards, Association or Industry Specifications, and other published standards, shall refer to the latest edition or publication of such standard.

PART TWO – PRODUCTS

2.1 MATERIALS FOR SODDING:

A. Topsoil furnished shall be a natural, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well drained areas. Topsoil shall be without admixture of subsoil and free from Johnson Grass (sorgamhalepense), nut grass (cyperus rotundus), and objectionable weeds and toxic substances. Topsoil to be furnished shall be free from trash, brush, and stones over one inch (1") in diameter, and other extraneous material. (Sandy loam will not be allowed).

B. Commercial fertilizer shall be an organic fertilizer containing the following minimum percentages of available plant food by weight: 13-13-13 Nitrogen-Phosphorus-Potash.

C. The sod shall contain a good cover of living or growing grass. The sod shall be obtained from areas having growing conditions similar to the sodded areas under this contract. Deliver sod on pallets. Protect root system from exposure to wind and sun. Do not deliver more sod than can be placed within 24 hours.

PART THREE – EXECUTION

3.1 SITE PREPARATION:

A. Review the existing conditions and sub-grade where feasible in the designated planting areas prior to submitting a bid. The planting areas shall be brought to roughly 4" below finished grade by the General Contractor. Scarify the sub-grade material to a minimum depth of 2" and remove all stones over 2" in size, sticks, and rubbish. Verify the drainage is adequate in the planting beds for all trees and shrubs. Depressions where water will stand or inequalities in the grade shall be corrected before additional topsoil is spread.

B. Protect all walks and drives during the installation of the top soil and landscape.

C. After review and preparation of the sub-grade, as specified above, furnish, place, and spread a minimum 3" depth of topsoil over all areas to be sodded. No topsoil shall be spread in a frozen or muddy condition.

3.2 SODDING

A. Fine grade the topsoil and prepare the areas for solid sod. Provide positive drainage away from buildings, walls and structures. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment so as to eliminate all air pockets, provide a true and even surface, and insure knitting without displacement of the sod or deformation of the surfaces of sodded areas. The sod shall be laid smoothly with staggered tight joints.

B. Allowance for settlement shall be made and after settlement of topsoil and placement of the sod, the top of the sod thickness shall be flush with the finished grades of all types of adjacent pavement. Every precaution shall be taken to insure that there is positive drainage away from the building in all areas and that a smooth and continuous grade is provided from the building out to the sidewalks.

C. Crown all sodded parking islands for positive drainage.

D. Water shall be applied in quantities and at intervals as required to provide optimum growing conditions for a uniform stand and cover of grass. Soil tests are to be taken and submitted to the County Agent for analysis of turf areas to specify fertilizer application based on the results of testing. Apply amendments according to the needs of the plant materials and soil to reduce the fertilizer input to run-off water quality.

E. On steep slopes, the Contractor shall, if so directed by the Owner's Architect, prevent the sod from sliding by means of wooden pegs or metal staples driven through the sod blocks into firm earth at suitable intervals.

F. Sod which is cut for more than 72 hours shall not be used unless specifically authorized by the Owner's Landscape Architect after his/her inspection thereof. Sod which is not planted within 24 hours after cutting shall be stacked in an approved manner and maintained with proper moisture. Any pieces of sod which, after placing, show an appearance of extreme dryness shall be removed and replaced with fresh, uninjured pieces.

G. Sodding shall not be performed when weather and soil conditions are, in the Landscape Architect's opinion, unsuitable for proper results.

H. After completion of sodding, the entire area shall be rolled thoroughly with the appropriate rolling equipment. At least two (2) trips over the entire area will be required to eliminate all air from under the newly planted sod.

I. Contractor is responsible for repair and sodding of all areas disturbed during construction on or adjacent to project, including irrigation trenches in existing turf areas. Extent of repairs to be determined by landscape architect prior to substantial completion.

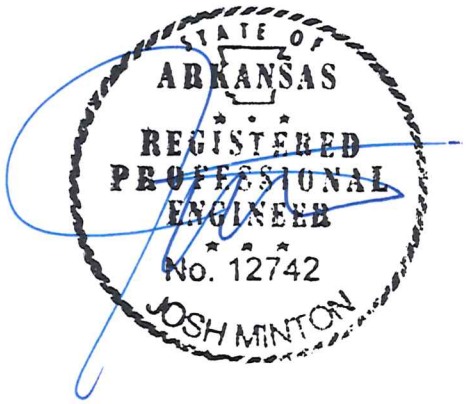
3.3 WATERING THE SOD

A. The area on which the sod is to be placed shall contain sufficient moisture, as determined by the Landscape Architect for optimum results. After being placed, the sod shall be kept in a moist condition to the full depth of the rooting zone for at least 2 weeks. There after, the Contractor shall apply water as needed until the sod roots and starts to grow for a minimum of 60 days (or until final acceptance, whichever is latest).

END OF SECTION

The Engineer of Record for Paragould Public Works, Paragould, Arkansas Division 33, Sections 330000 specifications.

August 16, 2024



Section 33 00 00

UTILITIES

PART ONE - GENERAL

1.1 DESCRIPTION

A. 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.

B. The scope of work shall include the general listings as shown below. This contractor shall furnish and install all required pipe, fittings, valves, supports, blocking, and other such equipment, items, and appurtenances as may be required for complete and operative systems, including all parts auxiliary to the systems.

1.2 APPLICABLE GENERAL SPECIFICATIONS AND REGULATION

A. 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.

B. All utility 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. Arkansas Department of Health
2. National Fire Protection Association Recommended Practice
3. Local, City and State Codes and Ordinances.

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. The contractor shall not begin any building construction until possessing a copy of official acceptance of the Arkansas State Department of Health Department of Engineering which shall be provided by the Architect.

E. Prior to final acceptance of the project, the contractor shall provide the Architect copies of the Health Department sample test report, pressure test report, and system approval letter issued by the city.

1.3 SUBMITTALS

A. In accordance with Division One of the General Conditions, the Plumbing Contractor shall furnish the Architect five (5) complete sets of certified shop drawings. Submittal must be complete and in one installment in five bound manuals with title sheet and numbered index at the beginning of each. Piecemeal and unbound submittals will be returned without consideration.

B. 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.

C. All performance, data, details, dimensions, special features and accessories must be clearly marked.

D. All differences between equipment specified and that submitted must be clearly indicated.

E. Substitutions will not be considered without prior approval from the engineer.

F. Shop Drawings are required even though the equipment is as specified.

G. Provide Shop Drawings on the following Items:

a. Piping and fittings.
b. Valves.
c. Fire hydrant.
d. Sterilization procedure.
e. Pressure testing procedure.

H. 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.

I. 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.

J. 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.

K. 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

A. 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

A. Contractor shall pay for all fees, permits and charges for utility connections. 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

A. 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.

B. 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

A. The contractor shall provide two (2) sets in hardback three-ring binders of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and shall present this compilation to the Architect for transmittal to the Owner before final payment is made. In each maintenance catalog shall be provided a complete set of approved submittals on all mechanical equipment, descriptive data, installation data, operating instructions, parts lists and maintenance instructions.

B. A complete double index shall be provided: (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

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 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

A. 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 SOIL CONDITIONS

A. This specification and drawings in no way implies 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.

1.11 VISITING SITE

A. 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.

1.12 STANDARD PRODUCTS

A. 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.

1.13 STORAGE OF MATERIALS

A. 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.

B. 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.

1.14 EQUIPMENT FURNISHED UNDER OTHER SECTIONS

A. This Contractor shall provide all necessary material and labor for the connection to the building plumbing and fire service systems. Coordinate with the appropriate trades for connection requirements and scope of work.

PART TWO - PRODUCTS

2.1 PIPE

A. Exterior sewer service piping:

1. Gravity sanitary sewer lines beyond 5'0" from building line shall be SDR-26 heavy wall PVC gasketed sewer pipe. Class 50 Ductile Iron is required for a portion of the exterior sewer as noted on the Site Utility Plan.
2. PVC pipe for gravity 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.
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.
4. All pipe sections shall be straight and true in alignment and shall be furnished in (13) feet lengths. Provision shall be made for expansion and contraction at each joint by use of a gasket type joint and integral bell.
5. Users of PVC pipe are to take particular notice of the bedding and backfilling requirements for PVC gravity sewer pipe listed in paragraph 3.8.3 and the testing requirements listed in Section 3.3.
6. All bends, tees, plugs, adaptors, wyes, or other fittings shall meet with the requirements of the type of pipe used and all joints shall meet with the requirements for the joints listed in Part Three. PVC sewer wyes, tee-wyes, bends or other fittings shall be one piece molded construction with elastomeric gaskets conforming to ASTM 3212 and ASTM F-477, self-cleansing sanitary flow and design meeting ASTM 3034 standards.

B. Exterior water service piping:

1. Exterior water piping shall be SDR 21 PVC with gasketed joints, 200 PSI for sizes two (2") inches and larger and type "K" hard drawn copper for 1-1/2" and smaller. Minimum depth to be 36". Any mechanical joints shall have to be coated with mastic and covered with two layers of 6 mil visqueen, secure with duct tape. Install No. 12 THHN copper tracer wire for PVC piping. Piping 2" and larger shall be gasketed-joint.
2. Unless detailed specifically on plans, all valves, controllers or meters below grade will be located in a concrete box with a cast iron cover equal to Neenah R-1912 series. PVC boxes are not acceptable.
3. Contractor shall verify water service arrangements and pay all charges required by local water utility. Meter type shall be as required by local utility and shall be sized to water service demand as indicated on plans. Contractor shall furnish a water shut off valve on both sides on the meter, unless otherwise instructed by local utility.

C. Water main piping:

1. Water main piping shall be C900 PVC and shall meet the requirements of DR14 per AWWA C150. Joints shall be bell and elastomeric ring. Fittings shall be mechanical joint ductile iron. Install No. 12 THHN copper tracer wire full length of PVC piping and terminate in accessible location.D.

2.2 PIPE UNIONS

A. 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.

B. 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.

C. Each above ground portion of the gas piping system shall be bonded to a grounding electrode in accordance with National Electrical Code. Unless approved otherwise, grounding system shall consist of 10'0" electrode rod and No. 8 copper wire with grounding clamps.

2.3 VALVES

A. Water main valve: Resilient seat, non-rising stem gate valve with 0-ring stem seals, 2" square operating nut and a working pressure of 200 psi. Valves shall be manufactured by Mueller Company. See detail on drawings for valve box.

2.4 CONCRETE THRUST BLOCKS

A. Install thrust blocks on water main or service at each change of direction and as indicated on drawings. Thrust block shall have a minimum compressive strength of 3000 psi at 28 days. Blocking shall be supported by undisturbed soil.

PART THREE - EXECUTION

3.1 PIPING INSTALLATION

A. Gasketed Polyvinyl Chloride (PVC) 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. Public water mains to be installed in accordance w/ AWWA C605-13.

3.2 CROSS CONNECTIONS

A. 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.

3.3 TESTING

A. 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.

B. 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.

C. Building Sewer: 6" or larger sewer consisting of multiple manholes shall be tested for deflection and air tested for watertightness.

1. Deflection test (PVC piping only): After the pipe has been laid and backfilled, the Contractor shall perform a deflection test on all PVC sewer pipe. This test shall consist of pulling a mandrel through the pipe with a maximum allowable deflection of 5 percent.
2. Leak test (low pressure air):
    a. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
    b. Pipe air supply to the pipeline to be tested in such a manner that the air supply may be shut off, pressure observed, and air pressure released from the pipe without entering the manhole.

c. Add air slowly to portion of pipe under test until the internal pressure of the line is raised to approximately 4 psig, but less than 5 psig.

d. Shut the air supply off and allow at least two minutes for the air pressure to stabilize.

e. When the pressure has stabilized and is at or above the starting test pressure of 3.5 psi, start the test.

f. Determine the time in seconds with a stopwatch for the pressure to fall 0.5 psig so that the pressure at the end of the time is at least 3.0 psig.

g. The minimum time allowed for the pressure to fall 0.5 psig on 597 ft. of 4" pipe is 1 min.53 sec., 398 ft. of 6" pipe is 2 min.50 sec., and 298 ft. of 8" pipe is 3 min.47 sec. For minimum time required on pipe exceeding these limits, verify with the Engineer prior to testing.

h. Use extreme caution when conducting this test. The low pressure air test may be dangerous to personnel if, through lack of understanding or carelessness, a line is over pressurized or plugs ar installed improperly. It is extremely important that the various plugs be installed so as to prevent the sudden expulsion of a poorly inflated plug. As an example of the hazard, a force of 250 pounds is exerted on an 8 inch plug by an internal pressure of 5 psi. Observe the following safety precautions:

    1) No one shall be allowed in the manholes during the test or when a plugged pipe is under pressure.
    2) Gauges, air piping manifolds, and valves, shall be located at the top of the ground.
    3) Install and brace all plugs securely.
    4) Do not over pressurize the lines.

3. 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.

4. Reduced Pressure Backflow Preventer: All backflow assemblies shall be tested by an assembly testing technician certified by the state. Provide backflow assembly test forms to water utility company and Architect.

5. Water main system (fire main) - Hydrostatic and leaking testing: (In accordance w/ AWWA C605)

    a. After the pipelines or isolated section of the pipelines have been filled with water, the pressure shall be increased to the test pressure by means of a pump.

    b. The Contractor shall furnish a pump and appurtenances as described in Section 3.3.8.11 below and all labor for conducting all tests. In some cases the Owner will furnish the meter and pressure gauge, however, the Contractor shall be prepared to furnish these items. The meter and gauge shall be calibrated accurately. The meter shall register in gallons.

    c. The test pressure shall be 160 psi or as specified. All pipelines and appurtenances shall be tested.

    d. The duration of the leakage tests shall be two (2) hours or as specified by the Engineer. The source of water for the pump suction shall be a water pipeline in the Owner's distribution system. The vessel used must be approved by the Engineer.

e. All interior valves including valves on fire hydrant and other appurtenances shall be open during all tests.

f. After the specified test pressure has been applied the entire pipe line shall be checked in the presence of the Engineer, giving particular attention to the part of the pipeline and those appurtenances that are exposed.

g. If leaks are apparent, the Contractor shall, at his own expense, perform whatever work and/or replace whatever material that is required in order to remedy the defect and stop the leaks. All corrective work shall be approved by the Engineer.

h. After the Contractor has taken the necessary action to repair or replace any part of the pipeline or appurtenances where leaks were apparent or if no leaks were apparent, the pipelines shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.

i. The maximum leakage per hour shall be as calculated from the following formula:

$$Q = \frac{LD\sqrt{P}}{148{,}000}$$

Where:

Q = Quantity of make-up water in gallons per hour.

L = Length of pipe section being tested, in feet.

D = Nominal diameter of the pipe, in inches.

P = Average test pressure during the hydrostatic test in pounds per square inch (gauge).

j. If any test of pipe laid discloses leakage greater than the allowable leakage as calculated from above formula or table, or leaks are discovered after testing, the Contractor shall, at his expense, locate the leak or leaks and perform whatever work and/or replace whatever materials that is required in order to remedy the defect and stop the leak. All corrective work must be approved by the Engineer.

k. Test Pump:

1) The contractor shall provide a water pump for testing the mains hydrostatically. The pump shall have the following features:

2) Designed so that the required test pressure can be attained and equipped with a by-pass between the pump suction and discharge. By-pass shall be equipped with an in-line valve and a valved exhaust outlet.

3) The pump discharge shall be equipped with the following, in the order listed from the pump outward:

a) Pump by-pass outlet.

b) Check valve arranged so as to prevent flow back toward pump.

c) Adjustable pressure regulating device capable of maintaining discharge pressure at a constant level.

d) Valved exhaust outlet.

e) Section of flexible hose – length sufficient that ends of hose rest on ground.

f) Straight meter coupling – 1/2” M.I.P. x 3/4” F.I.P.

g) 5/8” meter.

h) Straight meter coupling – 1” M.I.P. x 3/4” F.I.P.

i) Outlet for pressure gauge. Outlet shall be equipped with valve and surge dampening device. Connection for gauge shall be 1/4" F.I.P.

j) The pump suction shall be equipped with the following from the pump outward:

i. Pump by-pass outlet.

ii. Suction pipe.

iii. End strainer to prohibit entry of foreign matter if pump suction is connected to a vessel instead of a water main.

l. The Contractor shall provide all other necessary connections for connecting pump to suction source and the main to be tested.

6. Test compliance letter:
Contractor shall furnish to the Architect a letter of compliance for each test as completed and inspected by the job superintendent and city authorities.

3.4 STERILIZATION

A. Water main system: In accordance with AWWA (651).

1. Disinfecting pipe lines and appurtenances: In accordance with AWWA (651).
2. Blowoff and sample points shall be constructed by the Contractor as shown on the plans or as directed by the Engineer. Fire hydrants are not satisfactory for sample points. Openings for sample points shall be 3/4" copper riser pipe which extends well above the surface. The line shall not be considered acceptable until two (2) consecutive samples taken twenty-four (24) hours apart are negative.
3. There are two acceptable methods of disinfecting: continuous feed method using liquid chlorine or calcium hypochlorite and the slug method using liquid chlorine or calcium hypochlorite. The slug method applies to large mains and shall be used only when the Contractor has suitable equipment available and employees who are familiar with the physiological, chemical and physical properties and who are properly trained and equipped to handle any emergency that may arise. If in the opinion of the Engineer, the equipment is inadequate or the personnel are not qualified, this method shall not be used.
4. When the continuous feed or slug method is to be used, the pipelines and appurtenances shall be thoroughly flushed prior to disinfecting. The flushing plan shall be approved by the city. The city may halt or reduce flushing if the distribution system pressures are reduced by the flushing operations.
5. Chlorine is a powerful oxidant and reacts readily with foreign substances. All chlorine compounds shall be handled and stored in accordance with the manufacturers recommendations. breathing of chlorine gas can be fatal. Hypochlorite solutions should not come into contact with skin or clothing. Containers used for mixing hypochlorite solution shall be clean and dry.
6. Calcium hypochlorite shall contain 60% available chlorine by weight either in tabular or granular form.
7. When the continuous feed or slug method is used or the source of chlorine is calcium hypochlorite, a solution of hypochlorite and water shall be prepared by mixing thoroughly in a suitable container. The mix shall contain one (1) pound of calcium hypochlorite per gallon of water. A suitable pump shall be provided for pumping this solution into the pipelines to be disinfected. This pump shall be equipped with a flow measuring device.

8. When liquid chlorine is used the equipment for injection shall consist of a solution feed chlorinator in combination with a booster pump for injecting the chlorine gas water solution into the pipe line Introduction of chlorine gas directly from the supply cylinder shall not be permitted. The pump shall be equipped with a flow measuring device.
9. During the application of any chlorine solution, care shall be taken to assure that the solution does not blow back into the distribution system.
10. The procedures for disinfecting by the continuous flow method shall be as follows:
    a. The flow through the pipeline and the solution flow shall be regulated so that the required concentration of chlorine is attained. The flow through the main shall be measured by using a pitot gauge or meter.
    b. The introduction of the solution shall be continuous until the desired concentration is attained throughout the pipeline system. The concentration shall be checked by the Drop Dilution Method.
    c. After the required concentration has been attained all internal valves shall be operated in order to assure that the solution comes in contact with all appurtenances.
    d. The solution shall remain in the pipe line system for 24 hours after which the pipelines shall be thoroughly flushed. The chlorine concentration shall be checked before flushing. If the concentration is less than 25 parts per million the disinfection procedure shall be repeated if directed by the Engineer.
11. The procedure for disinfecting by the slug method shall be the same as the continuous flow method except that the flow rates shall be regulated so that the specified concentration of chlorine shall be in contact with all parts of pipe line for at least one (1) hour.
12. After final flushing, two series of samples of water shall be collected from the sample points provided by the Contractor and tested by the Owner at a certified laboratory of the Arkansas State Health Department. The Contractor shall provide any assistance required in collecting the samples.
13. If any of the samples collected are positive, the disinfecting procedures shall be repeated as directed by the Engineer until negative samples are collected. Only the continuous flow or slug method may be used.
14. The cost of water used for flushing after positive samples have been collected may be deducted from the amounts due Contractor. The amount used shall be determined by measurements of flow using a pilot gauge. Payment shall be based on the lowest prevailing water rate.

3.5 CERTIFICATE OF INSPECTION

A. 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.

3.6 EXCAVATING AND TRENCHING FOR PIPING

A. 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.

B. 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.

C. 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, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor, at his expense.

D. Separation of private utilities: Water, gas and sewer piping shall be installed in separate trenches. In no case shall any utility piping be installed in same trench as electrical lines, TV cable, intercom, etc. The underground water service pipe and the building drain, or building sewer shall not be less than 10 feet apart horizontally and shall be separated by undisturbed or compact earth When approved by Engineer the water and sewer may be installed in same trench provided the water is 18" above the sewer at all points. The combining of gas and water must be approved by the Engineer and the Local Administrative Authority.

E. Separation of public utilities: The operating routine shall include necessary protective measures to detect and remove or destroy any contaminant of concern or regulation that might enter the distribution system. Every precaution must be taken against the possibility of sewage contamination of the water in the distribution system. Water mains and sanitary sewers shall be constructed as far apart as practicable, and shall be separated by undisturbed and compacted earth. A minimum horizontal distance of ten feet should be maintained between water lines and sewer lines or other sources of contamination. Water lines and sewers shall not be laid in the same trench except on the written approval of the Arkansas Department of Health & Human Services. Water mains necessarily in close proximity to sewers must be placed so that the bottom of the water line will be at least 18 inches above the top of the sewer line at its highest point. If this distance must unavoidably be reduced, the water line or the sewer line must be encased in watertight pipe with sealed watertight ends extending at least ten feet either side of the crossing. Any joint in the encasement pipe is to be mechanically restrained. The encasement pipe may be vented to the surface if carrying water or sewer under pressure. Where a water line must unavoidably pass beneath the sewer line, at least 18 inches of separation must be maintained between the outside of the two pipes in addition to the preceding encasement requirement. Exceptions to this must be approved in writing by the Arkansas Department of Health & Human Services. A minimum horizontal distance of three feet shall be maintained between water lines and other underground utilities of a nonsanitary nature (gas, electric, etc.). Exceptions to this must be approved in writing by the Arkansas Department of Health and Human Services.

3.7 BACKFILLING OF TRENCHES

A. 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.

B. 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.

C. The embedment for schedule 40 PVC sanitary sewer below slab shall consist of crushed stone or rock (3/4” maximum) Class 1 material which is 6" below and above the pipe. Embedment for PVC sanitary and storm sewer piping exterior of building shall be manufactured angular, granular material, 1/4 to 1-1/4 inches in size (no fines), 6" below and above the pipe. The remaining backfill shall be compacted as outlined in Section 31 22 00 – Grading. The maximum bury of PVC pipe shall be sixteen (16) feet.

D. The bedding requirement for water mains, and exterior fire lines and domestic water lines shall have a maximum angular particle size less than or equal to ¾” as per AWWA C-605.

E. Backfill for trenches not below building, paving, sidewalks, etc., may be compacted to 90% Standard Proctor in accordance with ASTM D698. Backfill may be SB-2 below paving or asphalt and select native fill below topsoil. Select fill material used for pressure PVC pipe bedding must meet AWWA-C605-13 Standards (3/4” maximum for angular rock and 1 1/2” maximum for rounded rock).

F. Tests for displacement of sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the Contractor at his expense.

3.8 CUTTING AND PATCHING

A. 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.

3.9 DEFECTIVE WORK

A. 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.

3.10 CLEANUP

A. 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.

3.11 GUARANTEE

A. 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.

B. 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.

END OF SECTION

Section 33 40 00

STORM WATER UTILITIES

PART ONE - GENERAL

1.1 WORK INCLUDED

A. This section includes the installation of the concrete paved drain, storm sewers, end sections, curb inlets, inlet boxes, man-holes, head and wing walls, and junction boxes at the location and to the lines and grades shown on the drawings, or as directed by the Architect.

1.2 QUALITY ASSURANCE

A. 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.

B. 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

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.

PART TWO - PRODUCTS

2.1 REINFORCED CONCRETE PIPE

A. Reinforced concrete pipe (RCP) shall conform to the latest ASTM Designation C76-65T, and ASTM Designation C506-63T for concrete arch pipe. The design requirements shall be for H-20 truck loading plus impact meeting all requirements set forth in “Table III-Design Requirements for Class III Reinforced Concrete Pipe, C76-65T and C506-63T”.

PART THREE - EXECUTION

3.1 Provide a gradation plan which will verify all conditions of existing storm drainage connections for approval to the Architect's representative prior to construction.

3.2 All equipment necessary and required for the proper construction of storm sewers shall be on the project in first-class condition and shall have the approval of the Architect. The Contractor shall provide the necessary tampers and pneumatic tampers to obtain the compaction of the pipe bed and backfill as specified.

3.3 Inlets and headwalls shall be constructed as shown on the drawings.

3.4 Pipe outlets shall be sealed and made watertight.

3.5 Excavation: Where a trench is required, it shall be excavated to the line and grade shown on the plans and as established by the Architect, and only to a width sufficient to permit thorough tamping of the backfill material under the haunches and around the pipe as hereinafter specified, but the width shall not exceed the external diameter by more than two feet (2') on each side except where unsuitable material is encountered.

3.6 Bedding: The pipe shall be bedding in an earth foundation of uniform density, carefully shaped to conform to the grade and to the camber established by the Architect. When rock in either ledge or boulder formation is encountered, it shall be removed below grade and replaced with suitable materials in such a manner as to provide a compact earth cushion having a thickness under the pipe or not less than six inches (6"). When a firm foundation is not encountered at the grade established due to soft, spongy or other unstable soil, all such unstable soil under the pipe, for a width of at least one-half (1/2) diameter on each side of the pipe or to the side of the trench and for a maximum depths of three (3') or as directed by the Architect, shall be removed and replaced with well compacted granular material to provide an adequate support for the pipe.

3.7 Lines and Grades for Pipe Laying:

A. The Contractor shall provide the necessary mason's lines and batter boards to insure the pipe is laid to the lines and grades shown on the drawings or as adjusted by the Architect.

B. The Architect shall inspect all pipe before and after it is laid and reject any pipe damaged or defective. Pipe laying shall be started at the lowest point and laid up-grade.

3.8 Installation and Assembly of Reinforced Concrete Pipe: All pipe shall be carefully laid tongue end up-grade, spigot end fully entered into tongue end, and true to line and grade. All joints shall be filled and wiped. Bituminous joint material conforming to AASHTO Standards. The inside of the joint shall be wiped and finished smooth.

3.9 Installation and Assembly of HDPE Piping: All HDPE pipes and fittings shall be installed in strict accordance with ASTM D2321 and per the manufacturer's standards and specifications. Only the manufacturer's joint lubricant shall be used.

3.10 Installation and Assembly of PVC Piping: 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.

3.11 Backfilling: The material used for backfilling storm sewers shall be at optimum moisture, shall be free from large lumps, clods, or rocks and shall be placed alongside and over storm sewers in layers of not more than six inches (6”) and thoroughly compacted to at least the density of the adjacent undisturbed earth to an elevation of two feet (2’) above the top of the pipe. The remainder of the backfill material shall then be placed into the trench in not more than eight inch (8”) layers and thoroughly tamped. Open trenches in and across roadways shall be backfilled as specified above, except that the entire depth of the trench shall be backfilled in no more than six inch (6”) layers, each maximum density, both as obtained by the Standard Method of Test for Compaction and Density of Soils, AASHTO T-180, Method D.

END OF SECTION