

**Project Manual and Specifications**

**London-Laurel Speculative (Shell) Building  
On Greta Lane**

**for the**

**London-Laurel County Economic  
Development Authority  
Laurel County, Kentucky**

**MSE Project Number: 2040-112**

**June 2023**

**Table of Contents**  
**London-Laurel Economic Development Authority**  
**Speculative (Shell) Building 2023**

**Division 0 – Bidding and Contract Requirements**

00020	Advertisement for Bids
00100	Instructions to Bidders
00310	Bid Schedule
00410	Bid Security Form
00480	Non-Collusion Affidavit and Form
00490	Notice of Award
00500	Agreement
00610	Performance Bond and Labor and Material Payment Bond
00650	Certificates of Insurance
00670	Certificate of Owner's Attorney
00680	Notice to Proceed
00800	Supplemental Conditions
00815	Supplemental General Conditions Part Two

**Division I – General Requirements**

01010	Summary of Work
01027	Applications for Payment – Requirements of Contractor
01028	Modification Requirements – Requirements of Contractor
01039	Coordination and Meetings – Requirements of Contractor
01041	Project Coordination
01045	Cutting and Patching – Requirements of Contractor
01050	Field Engineering
01090	Reference Standards
01300	Submittals
01310	Construction Progress Schedules
01400	Quality Control
01410	Testing Services
01500	Construction Facilities & Temporary Controls – Requirements of Contractor
01510	Temporary Utilities – Requirements of Contractor
01580	Project Identification and Signs – Requirements of Contractor
01590	Field Offices and Sheds – Requirements of Contractor

01620	Product Delivery, Storage and Protection
01650	Starting of Systems
01700	Project Closeout – Requirements of Contractor

## **Division II – Site Work**

02010	Soils Investigation
02100	Erosion Control
02110	Site Clearing
02200	Earth and Rock Work
02720	Storm Drainage Systems
02936	Seeding

## **Division III – Concrete**

03110	Concrete Formwork
03210	Concrete Reinforcement
03310	Cast-in-Place Concrete

## **Division IV – Masonry**

04200	Unit Masonry
-------	--------------

## **Division VII – Thermal and Moisture Protection**

07210	Building Insulation
07900	Joint Sealers

## **Division VIII – Door and Windows**

08100	Metal Doors and Frames
08361	Sectional Insulated Overhead Doors
08410	Aluminum Windows
08451	Structured Polycarbonate Panel Assemblies
08710	Finish Hardware
08800	Glass and Glazing

## **Division IX – Finishes**

09900	Painting
-------	----------

## **Division XIII – Special Construction**

13121	Pre-Engineered Buildings
-------	--------------------------

## INDEX

### MECHANICAL

SECTION		PAGE NO.
15050	GENERAL PROVISIONS AND REQUIREMENTS	15050-1 - 15050-4
15250	SCOPE OF WORK	15250-1
15600	MECHANICAL EQUIPMENT	15600-1



## **INDEX**

### **ELECTRICAL**

<b>SECTION</b>	<b>PAGE NO.</b>
16000	GENERAL PROVISIONS AND REQUIREMENTS
16025	SCOPE OF WORK
16050	BASIC MATERIALS AND METHODS
16140	WIRING DEVICES
16400	DISTRIBUTION EQUIPMENT
16500	LIGHTING
16900	CONTROLS

**SECTION 00020 - ADVERTISEMENT FOR BIDS**  
**London-Laurel County Economic Development Authority**  
**Greta Lane Speculative (Shell) Building Construction**  
**Laurel County, Kentucky**

Sealed bids for the construction of a 105,000 s.f. pre-engineered metal building with a concrete foundation will be received by the London-Laurel County Economic Development Authority, 4598 Old Whitley Road, London KY 40744 until 2:00 p.m., local time, June 26, 2023, and then at said office will be publicly opened and read aloud.

The CONTRACT DOCUMENTS may be reviewed at the following locations:

London-Laurel Co. EDA, 4598 Old Whitley Road, London KY  
MSE of Kentucky, Inc., 624 Wellington Way, Lexington KY  
ABC, 2020 Liberty Road, Bldg A, Suite 110, Lexington KY  
Builders Exchange, 2300 Meadow Drive, Louisville KY  
F W Dodge/AGC of Kentucky, 950 Contract St., Suite 100A, Lexington KY  
mselex.com

Copies of the Contract Documents may be obtained at the office of Lynn Imaging, 328 E. Vine St., Lexington, KY 40507, (859) 226-5850 upon receipt of a check made payable to Lynn Imaging in the amount of \$200.00 (non-refundable). All orders must be prepaid. There will be a 24-hour turn-around on all orders.

A certified check or bank draft, payable to London-Laurel County Economic Development Authority, government bonds, or a satisfactory bid bond executed by the bidder and acceptable sureties in an amount equal to five percent of the bid shall be submitted with bid. The successful bidder will be required to furnish and pay for the following: 1) 5% Bid Bond; and 2) A performance and payment bond for 100% of the contract price.

Each bidder must deposit with his bid, security in the amount, form, and subject to the conditions provided in the Information for Bidders.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions of this advertisement and/or the specifications and may waive any informalities or reject any and all Bids. Any proposal received after the time and date specified shall not be considered and will be returned unopened to the proposer. Sealed bid should be labeled "London-Laurel Greta Lane Speculative Building Project".

No Bidder may withdraw his Bid for a period of sixty (60) days after the actual date of the opening thereof.

Award will be made to the lowest, responsive, responsible bidder. Bidding is for the sole benefit of the London-Laurel County Economic Development Authority.

London-Laurel County Economic Development Authority is an Equal Employment Opportunity Employer.

End of Section

**SECTION 00100 - INSTRUCTIONS TO BIDDERS**  
**ADDITIONAL INFORMATION**

**PART 1 - GENERAL**

**1.01 DEFINITIONS**

- A. AIA Document A701/1987, Instructions to Bidders, Articles 1 through 8, inclusive, is a part of this Contract.
- B. General Conditions of the Contract for Construction, AIA Document A201/1997, Articles 1 through 14 inclusive, are a part of this Contract.

**1.02 BIDDING DOCUMENTS**

- A. The Bidding Documents are the Bidding and Contract Requirements, the Specifications, the Drawings and any addenda issued prior to receipt of bids.
- B. Documents are on file and may be examined or obtained for bidding purposes as stated in Section 00020 - Notice to Bidders.

**1.03 SUBSTITUTIONS AND APPROVALS DURING BIDDING**

- A. Whenever products or materials are specified as "Standards" or they are otherwise named, approval of other equal quality products shall be obtained by requesting in writing and presenting for evaluation, such product or material, to the Architect, no later than seven (7) days prior to date set for receipt of bids. Submittals circumventing the above time frame will not be processed.
  - 1. If approval is granted, product or material will be added by Addendum.
  - 2. No direct reply will be made to any requests for changes, but any requested changes approved by the Architect will be stated in an Addendum issued to all prime-bidders.
  - 3. Issuance of Bidding Documents does not constitute approval of products, materials, or subcontractors.

**1.04 ADDENDA**

Article 3: Bidding Documents. 3.4 Addenda, 3.4.3. Change the four days to read as follows: Addenda will be issued by the

Architect when in the opinion of the Architect the issuance of an addenda is in the interest of the bid process and the Owner.

#### 1.05 BIDDER'S REPRESENTATION

A. Each Bidder, by making his bid, represents that he has read and understands the bidding documents.

B. Each Bidder, by making his bid, represents that he has familiarized himself with the local conditions under which the Work is to be performed.

1. No additional costs of any type will be allowed by the failure of the Bidder to avail himself of the privilege of a complete and thorough, on-site inspection.

C. Each bidder must visit and inspect the site.

#### 1.06 BID SECURITY

A. Provide bid security in the form of Bid Bond, AIA Documents A310, for five percent (5%) of bid made payable to the London-Laurel County Industrial Development Authority. This security shall be forfeited if the bidder is awarded the contract and subsequently fails to enter into a contract with and furnish the required contract bond to the OWNER within ten (10) days after notice of acceptance of his proposal is made.

B. The bid security of all unsuccessful bidders will be returned promptly after an award has been made, or in the event that all bids are rejected. The bid security of the successful bidder will be returned when a satisfactory performance and labor and material payment bond has been furnished and the contract executed.

#### 1.07 PREPARATION OF BIDS

A. Bids shall be submitted in duplicate only on proposal bid form as included herein.

B. Any interlineation, alteration, or erasure will be grounds for rejection of the Bid. Bids shall contain no recapitulation of the work to be done.

C. Bids shall be based on the materials, construction, equipment and methods named or described in the specifications and on

the drawings, and any addenda issued prior to receipt of bids.

D. Proposals shall be sealed in an opaque envelope marked with the bidder's name and business address, and bearing the following caption:

1. Proposal for:

London-Laurel County Industrial Speculative Building #5

2. Proposals shall be addressed and delivered to:

London-Laurel County Industrial Development Authority  
Charlie Pennington, Executive Director  
4598 Old Whitley Road  
London, KY 40744

#### 1.08 BID SUPPLEMENTS

A. Bids shall be accompanied by the following supplemental documents, all properly signed and notarized:

1. Bid Security, Bid Bond, AIA Document A310

2. Document SC-1 - Subcontractors List (may use your own form)

3. Document PC-1 - Project Cost Breakdown (may use your own form)

4. Non-Collusion Affidavit

#### 1.09 SELECTION OF BIDS

A. The Owner reserves the right to reject any and/or all bids and to waive any informality in bidding.

#### 1.10 AWARD OF CONTRACTS

A. Contracts shall be deemed to have been awarded when Notice of Award shall have been duly served upon the Bidder by any officer or agent of the Owner duly authorized to give such notice. Before the contract becomes valid, the Bidder must provide all necessary bonds, insurance and other information herein called for.

#### 1.11 THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FURNISH THE FOLLOWING:

A. A One Hundred Percent (100%) Performance/Payment Bond, in an amount equal to the total contract price. This bond shall guarantee all labor and materials to be as required, the faithful performance of the contract and the prompt and

faithful payment of any claim or liens from any cause for which the Contractor is liable, including those for labor, materials, utility services, transportation costs and for supplies, equipment and machinery (or rental thereof).

- B. Such guarantee bonds shall remain in effect and full force for one (1) year after final acceptance of the work. Such bond shall not be executed as of a date prior to the executing of the contract.

#### 1.12 DETAILED COST BREAKDOWN

- A. Upon award of contract, Contractor will have seven (7) working days to generate a finalized detailed cost breakdown and a detailed project schedule of the project. All construction draws made on the project will require updating the Contractor's cost breakdown. Architect and Owner approval will be required on all pay requests.

#### 1.13 CONTRACTOR'S RESPONSIBILITY REGARDING SUB-CONTRACTORS

- A. It shall be prime contractor's responsibility to check all sub-bids carefully to determine whether or not any exceptions, omissions, or alterations to the drawings and specifications have been noted therein, as he is solely responsible for a complete job in strict accordance with drawings and specifications.

#### 1.14 COMMENCING WORK

- A. Contractor shall commence work within ten (10) days after written Notice to Proceed is issued by the Owner, unless otherwise arranged by the Owner.

#### 1.15 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

- A. These construction documents are to be governed, at all times, by applicable provisions of the federal laws, including but not limited to the latest amendments of the following:

- 1. William - Steiger Occupational Safety and Health Act of 1970, Public Law 91-596.

- 2. Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.

- B. All prime contractors, sub-contractors and their employees shall be solely responsible to conduct their work in

conformance with the regulations contained in this act and as amended. All material suppliers and manufacturers shall be fully aware of their responsibilities and the requirements of the finished project under the regulations of this Act, and as amended. Such materials and fabricated products incorporated in this project shall, at the time of installation or application, be in conformance with the regulations of this act, and as amended.

END OF SECTION

## SECTION 00310 - BID SCHEDULE

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"), organized and existing under the laws of the State of \_\_\_\_\_ doing business as \_\_\_\_\_\* to the London-Laurel County Economic Development Authority (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of Speculative Building on Greta Lane in strict accordance with the CONTRACT DOCUMENTS, within the time set forth and the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence Work under this contract on or before a date to be specified in the Notice to Proceed and to complete the Project within one hundred eighty (180) consecutive calendar days following the Notice to Proceed. BIDDER further agrees to pay as liquidated damages, the sum of \$600.00 for each consecutive calendar day thereafter as provided in the General Conditions and the Special Conditions.

BIDDER agrees to perform all the WORK described in the CONTRACT DOCUMENTS for the lump sum contained in the following Bid Schedule.

State Wage Rates apply to this project.

\*Insert "a corporation", "a partnership", or "an individual" as applicable.



Item	Description	Unit	Cost of Item
1.	Main Building with Office Entrance	LS	\$
2.	Mechanical	LS	\$
3.	Electrical	LS	\$
4.	Site Grading	LS	\$
5.	Testing Allowance	LS	\$ 20,000
6.	All Other Miscellaneous Costs	LS	\$
<b>TOTAL COST OF ITEMS 1 - 6</b>			<b>\$</b>

**ALTERNATE PROPOSALS:**

Alternate No. 1: \_\_\_\_\_

Add the sum of \_\_\_\_\_ (\$ \_\_\_\_\_)

The bid prices shall include all labor, materials, overhead, profit, insurance, and other costs necessary to install the finished work of the several items called for. Changes shall be processed in accordance with the General Conditions.

This is an invitation for offer to bid, not an offer to enter into a contract. If a bid is accepted, the contract will be awarded to either the lowest total cost of Items 1 - 6 or the total cost of Items 1 - 6 plus the Add Alternate.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_),

in accordance with the Information for Bidders. The BIDDER, by submittal of this Bid, agrees with the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the OWNER will suffer due to the failure of the BIDDER to fulfill his agreements as provided in this Proposal. \_\_\_\_\_

Addenda to the Drawings and Specifications issued heretofore are hereby acknowledged by the undersigned as being:

No. \_\_\_\_\_ Date: \_\_\_\_\_ No. \_\_\_\_\_ Date: \_\_\_\_\_  
 No. \_\_\_\_\_ Date: \_\_\_\_\_ No. \_\_\_\_\_ Date: \_\_\_\_\_

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the actual date of bid opening.

Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the Bidder will execute and deliver to the OWNER four (4) copies of the Agreement and such other required Contract Documents.

BIDDER:		
(Name of Company or Partnership)		
By:		
(Signature)		(Date)
(Print Name)		(Title)
(Street Address/P.O. Box)		(Phone Number)
(City, State, Zip)		
Attested By:	(Signature)	(Date)
Seal (If bid is by a corporation)		

END OF SECTION

## SECTION 00410 - BID SECURITY FORM

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Bid security for this project shall be in the form of a Bid Bond executed on AIA Document A310 form in the amount of five percent (5%) of the bid, made payable to the Owner.
- 1. The bid security of all unsuccessful bidders will be returned promptly after an award has been made or in the event that all bids are rejected. The bid security of the successful bidder will be returned when satisfactory performance and labor and material payment bonds (AIA Document A312) have been furnished and contract executed, including 1 year warranty period.

END OF SECTION

## **SECTION 00480 - NON-COLLUSION AFFIDAVIT**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The Non-Collusion Affidavit for the project shall be submitted with the bid proposal, and a copy of this document is bound herewith.
  - 1. When properly executed, this Document shall become a part of the successful bidder's Contract Document.

END OF SECTION

## NON-COLLUSION AFFIDAVIT

The undersigned bidder, on behalf of its officers and agents or representatives being duly sworn, states that it has not in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any other person or public officer whereby bidder has paid or is to pay to such other bidder or other person or public officer any sum or money, or has given or is to give to such other bidder or other person or public officer anything of value whatever, or such bidder or affiant or either of them has not, directly or indirectly, entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in the letting of the contract sought for by the attached bids; that no inducement of any form or character other than that which appears upon the face of the bid will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.


Subscribed and sworn to before me by \_\_\_\_\_ this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

My Commission expires:

\_\_\_\_\_

\_\_\_\_\_

Notary Public

END OF AFFIDAVIT

## SECTION 00490 - NOTICE OF AWARD

To:	

Project Description: Speculative Building at Greta Lane

The Owner has considered the Bid submitted by you for the above-described Work in response to its Advertisement for Bids dated \_\_\_\_\_ and Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of \$ \_\_\_\_\_

You are required by the Information for Bidders to execute the Agreement and furnish the Required Contractor's Performance Bond, Payment Bond and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 2023.

	<u>London-Laurel County Economic Development</u> <u>Authority</u> Owner	
	By _____	
	Name/Title	<u>Paula Thompson, Executive Director</u>

### ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by \_\_\_\_\_

this the \_\_\_\_\_ day of \_\_\_\_\_, 2023.

By	_____
Name/Title	_____

## **SECTION 00500 - AGREEMENT**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The contract Agreement for this project shall be AIA Document A101, Owner - Contractor Agreement Form - Stipulated Sum, June 1997 edition.
- B. This form, when fully executed, shall become a part of the successful bidder's Contract Documents.

END OF SECTION

## **SECTION 00610 - PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. A performance bond for 100% of the final contract amount shall be executed in favor of the Owner; the forms for this bond shall be AIA Document A 312, "Performance Bond", 1984 edition.
- B. Payment Bond, AIA Document A312, "Payment Bond", 1984 edition.
- C. Consent of Surety to Reduction in or Partial Release of Retainage: AIA Document G707A, 1994 Edition.
- D. Consent of Surety to Final Payment: AIA Document G707, 1994 Edition.
- E. Furnish the required bonds within seven (7) days of receipt of Notice of Award.
- F. When fully executed, these bonds shall become part of the successful bidder's Contract Documents.
- G. Application and Certificate for Payment: AIA Document G702 and G703, 1992 Edition.
- H. Contractors Affidavit of Payment of Debts: AIA Document G706, 1994 Edition.
- I. Contractors Affidavit of Release of Liens: AIA Document G706A, 1994 Edition.
- J. Certificate of Substantial Completion: AIA Document G704, 1992 Edition.

END OF SECTION



## **SECTION 00650 - CERTIFICATES OF INSURANCE**

### **PART 1 - GENERAL**

#### **1.01 GENERAL**

- A. Certificates of Insurance shall be filed with the Owner prior to the commencement of any work. Insurance shall be purchased by the General Contractor.
  - 1. These certificates shall contain a provision that coverages afforded under the policies shall not be canceled or in any way terminated until at least thirty days prior written notice has been given to the Owner and Architect.
  - 2. The Owner and the Architect shall be specifically named as additional insureds on all insurance coverage for this project.
- B. Detailed insurance requirements are covered in Section 00800 - Supplementary General Conditions, and all certificates shall reflect these minimum requirements for the project.

END OF SECTION

## SECTION 00670 - CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, \_\_\_\_\_, the duly authorized and acting legal representative of \_\_\_\_\_, do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

	Signature
	Date

NOTE: Delete phrase "performance and payment bonds" when not applicable.

## SECTION 00680 - NOTICE TO PROCEED

TO:		Date: _____
		Project: <u>Spec Building</u>
		<u>At Greta Lane</u>

You are hereby notified to commence WORK in accordance with the Agreement dated \_\_\_\_\_, on or before \_\_\_\_\_ and you are to complete the WORK within 180 consecutive calendar days thereafter. The date of completion of all WORK is therefore \_\_\_\_\_.

	London-Laurel County Economic Development Authority Owner
	Signature
	Paula Thompson, Executive Director Name/Title

### ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by \_\_\_\_\_  
this the \_\_\_\_\_ day of \_\_\_\_\_, 2023.

	Contractor
	Signature
	Name/Title

End of Section

## **SECTION 00800 - SUPPLEMENTAL CONDITIONS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The "General Conditions of the Contract for Construction," AIA Document A201, fifteenth edition, 1997, Articles 1 through 14, inclusive, is a part of this Contract.

#### **1.02 SUPPLEMENTS**

- A. The following supplements modify, change, delete or add to the "General Conditions of the Contract for Construction." Where any Article, Paragraph, Sub-Paragraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

### **PART 2 - ARTICLE 2: OWNER**

#### **2.01 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER**

- 2.2.5 The Contractor will be furnished, free of charge, five sets of Drawings and Project Manuals.

### **PART 3 - ARTICLE 3: CONTRACTOR**

#### **3.01 REVIEW OF CONTRACT SUB-PARAGRAPHS**

- A. Add the following sub-paragraphs:

- 3.2.2 The Contractor shall not perform any work at any time requested by persons other than the Architect. Any interpretations to the documents, or request for minor changes in the work will be by the Architect.
- 3.2.3 Where there is a conflict in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated on the more expensive way of doing the work and/or the larger quantity required. Only changes in interpretations covered by Addenda or in writing from the Architect will be permitted during construction of the work.

#### **3.02 WARRANTY**

- A. Add the following sub-paragraph:

- 3.5.2 General Contractor shall guarantee the work for a period of one year from the date of acceptance by the Owner, except where a longer guarantee is specified and will thus control and leave the work in perfect order at completion. Neither the final certificate of payment any provision in the Contract Documents shall relieve the Contractor of responsibility within the extent and period provided by said guarantee or by law whichever is longer. Upon written notice, he shall remedy any damage to other work resulting therefrom, including necessary labor for removing and replacing.

## **PART 4 - ARTICLE 8: TIME OF COMPLETION AND LIQUIDATED DAMAGES**

See the Bid Schedule, Section 00310, for the time allotted for this contract. The time allowed for completion shall begin at midnight, local time, on the date which the Owner shall instruct the Contractor, in writing, to start work, but not later than 7 days after Notice to Proceed.

The Contract completion time stipulated above includes an allowance for an average number of inclement weather days as follows:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Precip.	7	7	9	8	8	8	8	7	6	5	6	7
Freeze	10	6	1								1	5

When number of days (including Saturdays, Sundays and Holidays) of precipitation in excess of 0.1" per day or maximum daily temperatures of 32°F exceed those shown above in any month, the Contractor shall be entitled to an equal number of additional days for Contract Completion.

This provision for inclement weather shall only apply to that time while foundations are being constructed and prior to the building being "under-roof".

It is understood that time is the essence of this contract and that the Owner will sustain damages, monetary and otherwise, in the event of delay in completion of the work hereby contracted.

Therefore, if the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as part consideration for the awarding of this contract, to pay the Owner the amount specified in the contract, not as a penalty, but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the extreme difficulty in fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

## **PART 5 - ARTICLE 9: PAYMENTS AND COMPLETION**

### **5.01 APPLICATIONS FOR PAYMENT**

#### **A. Add the following sub-paragraph:**

9.3.1.1 Monthly payments will be based on ninety (90%) percent of the value of the work done and materials delivered and suitably stored until work under this contract is fifty (50%) completed. If at that time, progress of the work has been satisfactory, there will be no additional retainage, provided the Contractor submits Consent of Surety for each application, authorizing any remaining partial payments to be paid in full. The form of Application for Payment shall

**PART 6 - ARTICLE 11: INSURANCE AND BONDS**

**6.01 11.1 CONTRACTOR'S LIABILITY INSURANCE**

A. Change as follows:

General Contractor shall take out and maintain insurance of such types and in such amounts as are necessary to cover his responsibilities and liabilities on all projects, and shall require all his subcontractors to carry similar insurance.

1. The Owner will accept in lieu of all subcontractors carrying similar insurance an "Owner's and Contractor's Protective Liability Policy" paid for by the Contractor and written in the name of the Owner for the amount specified hereinafter including all the special coverages. Said policy must protect the Owner for all claims for bodily injury and/or property damage arising out of operations for the named insured by said Contractor, or any subcontractor of said Contractor.
- B. No Contractor shall commence work under this contract until he has obtained all insurance required under this section and such insurance has been approved by the Owner, nor shall any Contractor allow any subcontractor to commence work on his subcontract until the same insurance has been obtained by the subcontractor and approved by the Owner. Each and every contractor and subcontractor shall maintain all insurance required under paragraphs (1) and (2) of this section for not less than one year after completion of this contract.
- C. Each Contractor shall file with the Owner and Architect, a Certificate of Insurance. Any certificate submitted and found to be altered or incomplete will be returned as unsatisfactory.
- D. If requested by the Owner, Contractor shall furnish the Owner with true copies of each policy required of him or his subcontractors. Said policies will not be canceled or materially altered, except after fifteen (15) days advance written notice to the Owner and Architect, mailed to the addresses indicated herein.
- E. Insurance under this section, as a minimum, shall include the following coverages:
  1. Workman's Compensation and Employer's Liability Insurance: Workman's Compensation and Occupational Disease Insurance of statutory limits as provided by the state in which his contract is performed and Employers' Liability Insurance at a limit of not less than \$100,000.00 for all damages arising from each accident or occupational disease.
  2. Comprehensive General Liability Insurance covering:
    - a. Operations- Premises Liability:  
Including, but not limited to, Bodily Injury, including death at any time resulting therefrom, to any person or Property Damage resulting from

execution of the work provided for in this contract, or due to or arising in any manner from any act of omission or negligence of the Contractor and any Subcontractor, their respective employees or agents.

b. Contractor's Protective Liability:

Including, but not limited to, Bodily Injury, including death at any time, resulting therefrom to any person, or Property Damage arising from acts or omissions of any subcontractor, their employees or agents.

c. Products-- Completed Operation Liability:

Including, but not limited to, Bodily Injury, including death at any time, resulting therefrom to any person, or Property Damage because of goods, products, materials or equipment used or installed under this contract, or because of completed operation, which may become evident within one year after acceptance of the building, including damage to the building or its contents.

d. Contractual Liability:

Each and every policy for liability insurance, carried by each Contractor and Subcontractor, as required by this section shall specifically include Contractual Liability coverage with respect to Section F of this Division.

e. Special Requirements:

The insurance required under Paragraph (2) of this Section shall specifically include the following special hazards:

Property Damage caused by conditions otherwise subject to exclusions "x, c, u," Explosion, Collapse or Underground Damage.

Broad Form Property Damage endorsement, which has reference to property in the "care, custody, or control" of the insured.

"Occurrence" Bodily Injury coverage in lieu of "caused by accident."

"Occurrence" Property Damage coverage in lieu of "caused by accident."

f. Limits of Liability:

The insurance under Paragraph (2) of this Section shall be written in the following limits of liability, as a minimum:

<u>Bodily injury</u>	<u>Property Damage</u>
\$1,000,000 Each Person	\$1,000,000 Each Occurrence
\$3,000,000 Each Occurrence	\$2,000,000 General Aggregate
\$500,000 Aggregate Products	\$1,000,000 Aggregate Protective

<u>Bodily injury</u>	<u>Property Damage</u>
	\$1,000,000 Aggregate Contractual

3. Comprehensive Automobile Liability covering:
  - a. All owned, hired, or non-owned vehicles including the loading or unloading thereof.
  - b. Special Requirements: The insurance required under paragraph (3) of this section shall specifically include the following special hazards:

"Occurrence" Bodily Injury in lieu of "caused by accident."

"Occurrence" Property Damage in lieu of "caused by accident."

The insurance under Paragraph (3) of this section shall be written in the following limits of liability as a minimum:

<u>Automobile Bodily Injury</u>	<u>Automobile Property Damage</u>
\$1,000,000 Each Person	\$1,000,000 Each Occurrence
\$3,000,000 Each Occurrence	
\$3,000,000 Excess/Umbrella Liability	

F. Hold Harmless Agreement:

1. The Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself ) including the loss of use resulting therefrom and (b) is caused in whole or part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.
2. In any and all claims against the Owner or the Architect or any of their agents or employees by any employee of the Contractor, Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Hold Harmless agreement shall not be limited in any way by any limitation on the amount payable by or for the Contractor or any Subcontractor under workman's compensation acts, disability benefit acts or other employee benefit acts.



3. The obligations of the Contractor under this Hold Harmless Agreement shall not extend to any claim, damage, loss or expense arising out of professional services performed by the Architect, his agents, or employees, including (a) the preparation of maps, plans, opinions, reports, surveys, designs or specifications, and (b) supervisory, inspection or engineering services.

**PART 7 - ARTICLE 11.3: PROPERTY INSURANCE (Purchased by the General Contractor)**

7.01 A. Change the first sentence of paragraph 11.3.1 to read: The contractor shall purchase....

B. Change the second sentence of Paragraph 11.3.1 to read:

11.3.1 "This insurance shall include the interests of the Owner, the Contractor, the Subcontractor and Sub-Subcontractors in the work and shall insure against the perils of fire, extended coverage, vandalism, malicious mischief and theft."

C. Add the following subparagraph:

"11.3.1.1 If by the terms of this insurance any mandatory deductibles are required, or if the Owner should elect to increase the mandatory deductible amounts or purchase this insurance with voluntary deductible amounts, the Owner shall be responsible for payment of the amount of the deductible in the event of a paid claim."

11.3.6 Revise a portion on the first sentence in Subparagraph to read as follows:

"...and (2) the Architect, his consultants, and separation contractors, if any..."

D. Add the following Article to the General Conditions of the Contract for Construction:

**PART 8 - ARTICLE 15: EQUAL OPPORTUNITY**

8.01 15.1 Employment Policies

15.1.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or age. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, national origin or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates or pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

- 15.1.2 The Contractor and all Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sect, national origin or age.

**PART 9 - ARTICLE 16: CHARACTER OF WORKERS, METHODS, AND EQUIPMENT**

- 116.1 The Contractor shall, at all times, employ sufficient and equipment for prosecuting the work to full completion in the manner and time required by the contract, drawings, and specifications. Suitable number of foremen and supervisors shall be available on the job to insure proper prosecution and coordination of the work. All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.
- 16.2 Any person employed by the Contractor or by any subcontractor who, in the opinion of the Owner and Architect, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Architect, be removed forthwith by the Contractor or Subcontractor employing such person, and shall not be employed again in any portion of the work.
- 16.3 Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Architect may suspend the work by written notice until compliance with such orders.
- 16.4 After the beginning of work on the site, the Contractor may not remove his Superintendent from the project without the prior written approval of the Owner.

END OF SECTION

**Section 00815 - Supplemental General Conditions**  
**Part Two**

1	General Contractors and Sub-contractors are hereby notified that they are encouraged, to the greatest extent practicable, to purchase American-made equipment and products with funding provided under this Award.
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End of Section

## **SECTION 01010 - SUMMARY OF WORK**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY OF WORK**

- A. Work covers construction of the new London-Laurel County Speculative Building at Greta Lane.
- B. Related requirements specified elsewhere:
  - 1. Submittals- Section 01300
  - 2. Temporary Facilities- Section 01500
  - 3. Project Closeout - Section 01700
- C. Contractor's Duties:
  - 1. Except as specifically noted, provide and pay for:
    - a. Labor, materials, tools, and equipment.
    - b. Permits.
    - c. Fees.
    - d. Licenses.
    - e. Taxes.
  - 2. Give required notices.
  - 3. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of work.
  - 4. Promptly submit written notice to Architect of observed variance of Contract Documents from legal requirements.
  - 5. Contractor shall verify all grades, lines, levels, and dimensions indicated on the drawings and shall report any inconsistencies before commencing work.
  - 6. Each Sub Contractor shall be responsible for the layout for their specific phase of work.

#### **1.02 CONTRACT (OWNER AND GENERAL CONTRACTOR)**

- A. Construction work shall be under a single lump sum contract, which shall include all general construction, steel, concrete, mechanical, electrical, plumbing and site work, etc.

### 1.03 CONTRACTORS' USE OF PREMISES

- A. Confine operations at site to areas permitted by:
  - 1. Law.
  - 2. Ordinances.
  - 3. Permits.
  - 4. Contract Documents.
  - 5. Owner.
- B. Do not unreasonably encumber site with materials or equipment.
- C. Do not load structure with weight that will endanger structure.
- D. Assume full responsibility for protection and safekeeping of products stored on site.
- E. Move any stored products which interfere with operations of the Owner.

END OF SECTION

## **SECTION 01027 - APPLICATIONS FOR PAYMENT REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES:**

- A. Procedures of Contractor for preparation and submittal of applications for payment.

#### **1.02 RELATED SECTIONS**

- A. Document 00500 - Agreement: Contract Sum amounts of progress payments and retainages.
- B. Section 00800 - Supplementary Conditions: Progress payments and final payment.
- C. Section 01028 - Modification Requirements: Procedures for changes to the Work.
- D. Section 01300 - Submittals: Submittal procedures.
- E. Section 01700 - Contract Closeout - Final Payment

#### **1.03 FORMAT**

- A. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of Work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.

#### **1.04 PREPARATION OF APPLICATIONS**

- A. Present required information in typewritten form on specified AIA Documents.
- B. Execute certification by signature of authorized officer.
- C. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

- D. List each authorized Change Order as an extension on AIA G703 Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.
- E. Prepare Application for Final Payment as specified in Section 01700.
- F. Submit partial release of liens waiver for all work completed to date with each payment application.
- G. Submit up-to-date (revised) construction schedule.

#### 1.05 SUBMITTAL PROCEDURES

- A. Submit three copies of each Application for Payment.
- B. Submit an updated construction schedule with each Application for Payment.
- C. Payment Period: Submit at intervals stipulated in the Agreement.
- D. Submit with transmittal letter as specified for Submittals in Section 01300.

#### 1.06 DETAILED COST BREAKDOWN

- A. Upon award of contract, Contractor will have seven working days to generate a finalized cost breakdown of the project.

#### 1.07 SUBSTANTIATING DATA

- A. When Architect/Engineer requires substantiating information, Contractor shall submit data justifying dollar amounts in question.
- B. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

### **PART 2 - PRODUCTS**

Not Applicable.

### **PART 3 - EXECUTION**

Not Applicable.

END OF SECTION

## **SECTION 01028 - MODIFICATION REQUIREMENTS REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES:**

- A. Submittals.
- B. Documentation of change in Contract Sum and Contract Time.
- C. Change procedures.
- D. Construction Change Directive.
- E. Stipulated Sum change order.
- F. Execution of change orders.
- G. Correlation of Contractor submittals.

#### **1.02 SUBMITTALS**

- A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Change Order Forms: AIA G701 Change Order.

#### **1.03 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME**

- A. Maintain detailed records of work performed. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
- C. Provide additional data to support computations:
  - 1. Quantities of products, labor, and equipment.
  - 2. Taxes, insurance, and bonds.
  - 3. Overhead and profit.
  - 4. Justification for any change in Contract Time.
  - 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work performed, with additional information:
  - 1. Origin and date of claim.
  - 2. Dates and times work was performed, and by whom.
  - 3. Time records and wage rates paid.
  - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.



#### 1.04 CHANGE PROCEDURES

- A. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 1987 Edition, Paragraph 7.4 by issuing supplemental instructions on AIA Form G710.
- B. The Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within seven (7) days.

#### 1.05 CONSTRUCTION CHANGE DIRECTIVE

- A. Architect/Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time.
- C. Contractor shall include in his costs any and all costs associated with contract documents modification required by the Architect/Engineer as a part of modifications.
- D. Promptly execute the change in Work.

#### 1.06 STIPULATED SUM CHANGE ORDER

- A. Based on Proposal Request and Contractor's fixed price quotation.

#### 1.07 CHANGE ORDER

- A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- B. Architect/Engineer will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents pending Owner approval.
- C. Maintain detailed records of work performed.
- D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

#### 1.08 EXECUTION OF CHANGE ORDERS

- A. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

#### 1.09 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- C. Promptly enter changes in Project Record Documents.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

**SECTION 01039 - COORDINATION AND MEETINGS  
REQUIREMENTS OF CONTRACTOR**

**PART 1 - GENERAL**

1.01 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Progress meetings.

Given the size of the project, meetings will be kept to a minimum.

END OF SECTION

## **SECTION 01041 - PROJECT COORDINATION**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Project coordination.
- B. Construction mobilization.
- C. Schedules.
- D. Submittals.
- E. Coordination drawings.
- F. Closeout procedures.

#### **1.02 RELATED SECTIONS**

- A. Section 00800 - Supplementary Conditions
- B. Section 01011 - Summary of Project: Work sequence.
- C. Section 01039 - Coordination and Meetings: Progress meetings.
- D. Section 01700 - Contract Closeout: Contract Closeout Procedures.

#### **1.03 CONSTRUCTION MOBILIZATION**

- A. Comply with procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- B. Comply with instructions for use of temporary utilities and construction facilities.
- C. Coordinate field engineering and layout work.

#### **1.04 SCHEDULES**

- A. Submit preliminary progress schedule in accordance with Section 01310.
- B. After review, revise and resubmit schedule to comply with revised Project schedule. Submit revised or up-to-date schedule with each application for payment.
- C. During progress of work revise and resubmit as directed.

#### **1.05 SUBMITTALS**

- A. Provide submittals for review and transmittal to Architect/Engineer.
- B. Submit applications for payment on AIA G702 forms for review, and for transmittal to Architect/Engineer.
- C. Submit requests for interpretation of Contract Documents, and obtain instructions through the Architect/Engineer.
- D. Process requests for substitutions, and change orders.
- E. Deliver closeout submittals for review and preliminary inspection reports, for transmittal to Architect/Engineer.

#### 1.06 COORDINATION DRAWINGS

- A. Provide information required by Architect/Engineer for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect/Engineer.

#### 1.07 CLOSEOUT PROCEDURES

- A. Notify Architect/Engineer when Work is considered ready for Substantial Completion.
- B. Comply with Architect/Engineer's instructions to correct items of work listed in executed Certificates of Substantial Completion and for access to Owner occupied areas.
- C. Notify Architect/Engineer when Work is considered finally complete.
- D. Comply with instructions for completion of items of Work determined by Architect/Engineer's final inspection.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01045 - CUTTING AND PATCHING REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Requirements and limitations for cutting and patching of Work, including:
  - 1. Cutting, fitting, or patching that may be required to complete the work or make its several parts fit together properly.
  - 2. Uncovering work to provide for installation of ill-timed work.
  - 3. Removing and replacing defective work.
  - 4. Removing and replacing work not conforming to requirements of the Contract Documents.
  - 5. General Contractor shall be responsible for cutting and patching of construction as required to facilitate work, including work by his mechanical and electrical subcontractors. He shall assign proper trades normally associated with the materials being cut and patched to perform work.

#### **1.02 RELATED SECTIONS**

- A. Section 01010 - Summary of Work.
- B. Section 01300 - Submittals.
- C. Section 01620 - Product Delivery, Storage and Handling.
- D. Individual Product Specification Sections:
  - 1. Cutting and patching incidental to work of the section.
  - 2. Advance notification to other sections of openings required in work of those sections.

#### **1.03 SUBMITTALS**

- A. Submit written request in advance of cutting or alteration which affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, assess conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

### 3.03 CUTTING

- A. Execute cutting and fitting including excavation and fill to complete the Work.
- B. Uncover work to install improperly sequenced work.
- C. Remove and replace defective or non-conforming work.
- D. Provide openings in the Work for penetration of mechanical and electrical work.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

### 3.04 PATCHING

- A. Execute patching to complement adjacent Work.
- B. Fit Products together to integrate with other Work.
- C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- E. Restore work with new products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. When possible, do not cut-and-patch work which is exposed in occupied spaces of building, in a manner resulting in reductions of visual qualities or resulting substantial evidence of cut-and-patch work, both as judged solely by Architect. Remove and replace work judged by Architect to be cut-and-patched in a visually unsatisfactory or otherwise objectionable manner.

END OF SECTION



## **SECTION 01050 - FIELD ENGINEERING**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Survey and field engineering.
- B. Quality Control.
- C. Submittals.

#### **1.02 RELATED SECTIONS**

- A. Section 00800 - Supplementary Conditions: Basic site engineering requirements.
- B. Section 01700 - Contract Closeout: Project Record Documents.

#### **1.03 QUALITY ASSURANCE**

- A. Employ a Land Surveyor registered in the State of Kentucky and acceptable to Architect/Engineer, to perform survey work of this section.
- B. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate within 7 working days of Notice to Proceed or submit statement that the Contractor accepts full and complete responsibility for Surveyor's work.

#### **1.04 SUBMITTALS FOR REVIEW**

- A. Submit name, address, telephone and fax number of Surveyor before starting survey work.
- B. On request, submit documentation verifying accuracy of survey work.
- C. Submit a copy of site drawing signed by the Land Surveyor that the elevations and locations of the Work are in conformance with Contract Documents.

#### **1.05 PROJECT RECORD DOCUMENTS**

- A. Maintain a complete and accurate log of control and survey work as it progresses.

#### **1.06 EXAMINATION**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect/Engineer of any discrepancies discovered.

#### 1.07 SURVEY REFERENCE POINTS

- A. Contractor to locate and protect survey control and reference points.
- B. Control datum for survey is that established by Owner provided survey.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect/Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

#### 1.08 SURVEY REQUIREMENTS

- A. Provide field engineering services. Utilize recognized engineering survey practices.
- B. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- C. Periodically verify layouts by same means.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01090 - REFERENCE STANDARDS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Quality assurance.

#### **1.02 QUALITY ASSURANCE**

- A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- D. Neither the contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01300 - SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Submittal procedures.
- B. Shop Drawings.
- C. Test reports.
- D. Certificates.
- E. Erection drawings.

#### **1.02 REFERENCES**

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

#### **1.03 SUBMITTAL PROCEDURES FOR SHOP DRAWINGS**

A. All shop drawings must be reviewed by the General Contractor before submitting them to the Architect.

B. Transmit each submittal with accepted form, containing the following:

- 1. Date
- 2. Project title
- 3. Contractor's name and address
- 4. Notification of any deviations from the contract documents.
- 5. Identify project as "London-Laurel County Industrial Spec Building #4"
- 6. Other pertinent data as required.

C. Identify Project, Contractor, Subcontractor, Manufacturer or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

- 1. Provide identification of product or material size, type, finish and color as appropriate.
- 2. Field dimensions, clearly identified as such.
- 3. All working and erection dimensions, views, as required to indicate fully all construction and fabrication methods, profiles and materials.

D. On all shop drawings apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

#### 1.04 CERTIFICATES

- A. When specified in individual specifications sections, submit certification by the manufacturer, installation/application/subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

#### **PART 2 - PRODUCTS**

Not used.

#### **PART 3 - EXECUTION**

Not used.

END OF SECTION

## **SECTION 01310 - CONSTRUCTION PROGRESS SCHEDULES**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Format.
- B. Content.
- C. Revisions to schedules.
- D. Submittals.

#### **1.02 RELATED SECTIONS**

- A. Section 01011 - Summary of Work.
- B. Section 01027 - Applications for Payment: Application for payment.
- C. Section 01300 - Submittals: Shop drawings.

#### **1.03 REFERENCES**

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

#### **1.04 FORMAT**

- A. Prepare schedules starting with Notice to Proceed date through substantial completion, as a horizontal bar chart or Gantt chart with separate bar for each major portion of Work or operation, identifying first work day of each week.
- B. Sequence of Listings: The chronological order of the start of each item of Work.
- C. Scale and Spacing: To provide space for notations and revisions.
- D. Sheet Size: Maximum 30" x 42" OR multiples of 8½" x 11".

#### **1.05 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules for each stage of Work.
- E. Provide sub-schedules to define critical portions of the entire schedule.
- F. Include conferences and progress meetings in schedule.
- G. Show accumulated percentage of completion of each item, and total percentage of Work completed, to coincide with schedule of values in each application for payment.
- H. Provide separate schedule of submittal dates for shop drawings, product data, and

samples, including Owner furnished products and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.

- I. Include scheduling for fabrication of structural steel.
- J. Include scheduling of erection sequence of building structural steel, precast walls and delivery to site.
- K. Include scheduling of erection sequence of building precast walls and delivery to site.

#### 1.06 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

#### 1.07 SUBMITTALS

- A. Submit initial schedules within 15 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within seven days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Architect/Engineer.

#### 1.08 DISTRIBUTION

- A. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01400 - QUALITY CONTROL**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Quality assurance - control of installation.
- B. Tolerances
- C. Mock-up.
- D. Manufacturers' field services.

#### **1.02 RELATED SECTIONS**

- A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01410 - Testing Services.
- C. Section 01620 - Product Delivery, Storage and Handling.
- D. Section 01650 - Starting of Systems

#### **1.03 QUALITY ASSURANCE - CONTROL OF INSTALLATION**

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

#### **1.04 TOLERANCES**

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



### 1.05 MOCK-UP

- A. Tests will be performed under provisions identified in this section and identified in the respective Product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

### 1.06 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and additional products as specified, as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

## **PART 2 - PRODUCTS**

Not Used.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Examine and verify specific conditions described in individual specification sections.
- C. Verify that utility services are available, of the correct characteristics, and in the correct locations.

### 3.02 PREPARATION

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

END OF SECTION

## **SECTION 01410 - TESTING SERVICES**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Selection and payment.
- B. Agency responsibilities.
- C. Agency reports.
- D. Limits on testing authority.
- E. Contractor responsibilities.
- F. Schedule of tests.

#### **1.02 RELATED SECTIONS**

- A. Section 01300 - Submittals: Manufacturer's certificates.
- B. Section 01400 - Quality Control.
- C. Section 01650 - Starting of Systems: Testing, Adjusting, and Balancing of systems.

#### **1.03 REFERENCES**

- A. ASTM C802 - Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction.
- B. ASTM C1021 - Practice for Laboratories Engaged in the Testing of Building Sealants.
- C. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- D. ASTM C1093 - Practice for Accreditation of Testing Agencies for Unit Masonry.
- E. ASTM D290 - Recommended Practice for Bituminous Mixing Plant Inspection.
- F. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- G. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.
- H. ASTM E329 - Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.
- I. ASTM E543 - Practice for Determining the Qualification of Nondestructive Testing Agencies.
- J. ASTM E548 - Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.

- K. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

#### 1.04 SELECTION AND PAYMENT

- A. Architect will designate a firm or firms to provide construction testing/inspection services for the following listed types of work. Contractor will pay for services of testing/inspection agency or laboratory to perform specified testing from the allowance for testing.
  - 1. Concrete footings, foundations, rebar placement
  - 2. Soil Subgrades
  - 3. Concrete slabs
  - 4. Paving
- B. Observe tests and adjustments for mechanical, electrical, plumbing, piping, welding, conducted by the various trades subcontractors and provide independent verification of results to Architect, Contractor and Owner. Payment for such services shall be made from the Contractor's bid, not the testing allowance.
- C. Employment of testing\inspection agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
  - 1. Upon initial test results, if defects in the construction are found, further testing of these systems shall be the responsibility of the Contractor in order to ensure these items being tested are in compliance with the specifications.
  - 2. Testing required by defective materials or defective work shall be paid for by the Contractor and is not paid from the allowance.
  - 3. When initial tests requested by the Architect indicate non-compliance with the Contract Documents, costs of initial tests associated with that noncompliance will be deducted by the Owner from the Contract Sum, and subsequent retesting occasioned by the non-compliance shall be performed by the same testing laboratory and the costs thereof shall be paid by the Contractor.
  - 4. The test cost for and adjustments conducted for mechanical, electrical, plumbing and piping systems, including welding and bolt-tightening shall be included in the bid for the associated work.

#### 1.05 AGENCY RESPONSIBILITIES

- A. Test samples of mixes submitted.
- B. Provide qualified personnel at site with prior approval of Architect. Cooperate with Architect/Engineer and Contractor in performance of services.
- C. Perform specified sampling and testing of Products in accordance with specified standards.

- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or Products.
- F. Perform additional tests as required by Architect/Engineer and approved by the Owner.
- G. Attend progress meetings.

#### 1.06 AGENCY REPORTS

- A. After each test, promptly submit one copy of report to Architect/Engineer and Owner.
- B. Include:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in the Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
- C. When requested by Architect/Engineer, and approved by Owner, provide interpretation of test results.

#### 1.07 LIMITS ON TESTING AUTHORITY

- A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Agency or laboratory may not approve or accept any portion of the Work.
- C. Agency or laboratory may not assume any duties of Contractor.
- D. Agency or laboratory has no authority to stop the Work.

#### 1.08 CONTRACTOR RESPONSIBILITIES

- A. Cooperate with testing/inspection personnel, and provide access to the Work.
- B. Notify Architect/Engineer and testing agency 48 hours prior to expected time for operations requiring testing and inspection services.

#### 1.09 SCHEDULE OF TESTS

- A. Individual Specification Sections: Tests required and standards for testing.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- B. Construction Facilities: Access roads, parking and progress cleaning.

#### **1.02 RELATED SECTIONS**

- A. Section 01510 - Temporary Utilities.
- B. Section 01540 - Security.
- C. Section 01550 - Access Roads and Parking Areas.
- D. Section 01580 - Project Identification and Signs.
- E. Section 01590 - Field Offices and Sheds.
- F. Section 01700 - Project Closeout: Final cleaning.

#### **1.03 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### **1.04 WATER CONTROL**

- A. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

#### **1.05 PROTECTION OF INSTALLED WORK**

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

material manufacturer.

F. Prohibit traffic from landscaped areas.

#### 1.06 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

#### **PART 2 - PRODUCTS**

Not Used.

#### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01510 - TEMPORARY UTILITIES REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.

#### **1.02 RELATED SECTIONS**

- A. Section 01580 - Project Identification and Signs.
- B. Section 01590 - Field Offices and Sheds.
- C. Section 01700 - Contract Closeout: Final cleaning.

#### **1.03 TEMPORARY ELECTRICITY**

- A. Cost: By Contractor; provide and pay for power service required from utility source or on-site generators.
- B. Provide temporary electric feeder from electrical service at approved point of available service. Do not disrupt Owner's need for continuous service.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- D. Provide main service disconnect and over-current protection at convenient location.
- E. Permanent convenience receptacles may be utilized during construction.

#### **1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Provide and maintain incandescent lighting for construction operations.
- B. Permanent building lighting may be utilized during construction upon written approval from Owner.

#### **1.05 TEMPORARY HEATING AND AIR CONDITIONING**

- A. Provide and pay for heating and air conditioning devices and heat and air condition as needed to maintain specified conditions for construction operations.
- B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications and provided by manufacturer instructions.

#### **1.06 TEMPORARY COOLING**



- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.

#### 1.07 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

#### 1.08 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

#### 1.09 FACSIMILE SERVICE

- A. Provide, maintain and pay for facsimile service to field office at time of project mobilization.

#### 1.10 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization.
- B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

#### 1.11 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

#### 1.12 WARRANTY PERIOD

- A. The warranty period for all permanent equipment used for temporary purposes by the Contractor including lighting, heating and cooling equipment shall commence from date of final completion of the entire project.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01580 - PROJECT IDENTIFICATION AND SIGNS REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

There will be one (1) sign for this project.

#### **1.01 SECTION INCLUDES**

- A. Project identification sign.

#### **1.02 RELATED SECTIONS**

- A. Section 01010 - Summary of Work.

#### **1.03 QUALITY ASSURANCE**

- A. Design sign and structure to withstand 60 miles/hr wind velocity.
- B. Sign Painter: Experienced as a professional sign painter for minimum three years.
- C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

#### **1.04 SUBMITTALS**

- A. Section 01300 - Submittals: Shop drawings.
- B. Show content, layout, lettering, color, foundation, structure, sizes, and grades of members.

### **PART 2 - PRODUCTS**

#### **2.01 SIGN MATERIALS**

- A. Structure and Framing: New wood, structurally adequate.
- B. Sign surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.
- C. Rough Hardware: Galvanized.
- D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
- E. Lettering: Exterior quality paint, contrasting colors as selected.

#### **2.02 PROJECT IDENTIFICATION SIGN**

- A. One painted sign of construction, design, and content shown on Drawings, location designated.
- B. Content:

1. Project title, logo and name of Owner as indicated on Contract Documents.
  2. Names and titles of authorities.
  3. Names and titles of Architect/Engineer and Consultants.
  4. Name of Prime Contractor and major Subcontractors.
- C. Graphic Design, Colors, Style of Lettering: Designated by Architect/Engineer and approved by Owner.

## 2.03 PROJECT INFORMATIONAL SIGNS

- A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100-foot distance.
- B. Provide at each field office, and directional signs to direct traffic into and within site. Relocate as Work progress requires.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install project identification sign within 30 days after date fixed by Owner-Contractor Agreement.
- B. Erect at designated location.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

### 3.02 MAINTENANCE

- A. Maintain signs and supports clean, repair deterioration and damage.

### 3.03 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

## **SECTION 01590 - FIELD OFFICES AND SHEDS REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Temporary field offices and sheds.
- B. Maintenance and cleaning.
- C. Removal.

#### **1.02 RELATED SECTIONS**

- A. Section 01010 - Summary of Work.
- B. Section 01550 - Access Roads and Parking Areas.
- C. Section 01580 - Project Identification and Signs.
- D. Section 01620- Product Delivery, Storage and Protection.

#### **1.03 USE OF PERMANENT FACILITIES**

- A. Permanent facilities shall not be used for field offices or for storage.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS, EQUIPMENT, FURNISHINGS**

- A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

#### **2.02 CONSTRUCTION**

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove at completion of Work.
- C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
- D. Exterior Materials: Weather resistant, finished.
- E. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

- F. Lighting for Offices: 50 footcandles at desk top height, exterior lighting a. entrance doors.
- G. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.
- H. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

## 2.03 ENVIRONMENTAL CONTROL

- A. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain 68 degrees F heating and 76 degrees F cooling.
- B. Storage Spaces: Heating and ventilation as needed to maintain Products in accordance with Contract Documents; adequate lighting for maintenance and inspection of Products.

## 2.04 CONTRACTOR OFFICE AND FACILITIES

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Telephone: As specified in Section 01510.
- C. Fax: As specified in Section 01510.
- D. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.
- E. Other Furnishings: Contractor's option.

## 2.05 STORAGE AREAS AND SHEDS

- A. Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01620.

# **PART 3 - EXECUTION**

## 3.01 MAINTENANCE AND CLEANING

- A. Maintain approach walks free of mud, water, and snow.
- C. Sanitary service as needed to maintain clean, odor-free environment.

## 3.02 REMOVAL

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

## **SECTION 01620 - PRODUCT DELIVERY, STORAGE & PROTECTION**

### **PART 1 - GENERAL**

#### **1.01 APPLICABILITY**

- A. This Section applies to all products furnished under this Agreement. Shipments of equipment or materials to be used by the Contractor or its subcontractors shall be delivered to the site only during regular working hours. All shipping papers and shipments shall be addressed and consigned to the Contractor giving the name of the Project with address. Under no circumstances will Owner accept shipments directed to it or the Architect/Engineer unless otherwise specified.

#### **1.02 DELIVERY**

- A. Products shall not be delivered to the Owner or the Architect/Engineer.
- B. Products shall not be delivered to the project site until related shop drawings have been reviewed by the Architect/Engineer.
- C. Products shall not be delivered to the project site until appropriate storage facilities are in place (on-site storage space is very limited).
- D. Products shall be delivered to the site in manufacturer's original, unopened, labeled containers.
- E. The Contractor shall not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials-handling equipment.

#### **1.03 STORAGE AND PROTECTION**

- A. General:
  - 1. The Contractor shall store and protect products in accordance with the manufacturer's recommendations and the requirements specified herein. No on-site existing storage facilities are available for use by the Contractor. All on-site facilities for storage shall be furnished by the Contractor.
  - 2. The Contractor shall not block or restrict the use of public right-of way, access roads or private property with stored materials.
  - 3. The Contractor shall not store products where they will interfere with operations of the Owner.
  - 4. The Contractor shall protect all products from damage or deterioration by weather.
  - 5. The Contractor shall not store any products directly on the ground.

6. The Contractor shall not store any products in drainage ditches or areas where water may stand.
7. The Contractor shall label containers to identify materials inside using the terminology found in these Specifications.

B. Uncovered Storage:

1. The following types of materials may be stored out of doors without cover:
  - a. Masonry units
  - b. Reinforcing steel
  - c. Piping
  - d. Precast concrete items
  - e. Castings
2. The above mentioned materials shall be stored on wood blocking.

C. Fully Protected Storage:

1. The Contractor shall store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof; and fully enclosed walls on all sides.
2. The Contractor shall provide heated storage space for materials which would be damaged by freezing.
3. The Contractor shall protect mechanical and electrical equipment from being contaminated by dust and dirt.
4. The Contractor shall maintain temperature and humidity at levels recommended by manufacturer(s) for electrical and electronic equipment.

END OF SECTION

## **SECTION 01650 - STARTING OF SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting, and balancing.

#### **1.02 RELATED SECTIONS**

- A. Section 01400 - Quality Control: Manufacturers field reports.
- B. Section 01700 - Contract Closeout: System operation and maintenance data and extra materials.

#### **1.03 STARTING SYSTEMS**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

#### **1.04 DEMONSTRATION AND INSTRUCTIONS**



- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
  - 1. Warranty period to begin at start-up of season.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time at designated location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- F. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

## **PART 2 - PRODUCTS**

Not Used.

## **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 01700 - PROJECT CLOSEOUT REQUIREMENTS OF CONTRACTOR**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Spare parts and maintenance products.
- G. Warranties and bonds.

#### **1.02 RELATED SECTIONS**

- A. Section 01650 - Starting of Systems: System start-up, testing, adjusting, and balancing.

#### **1.03 CLOSEOUT PROCEDURES**

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- B. Provide submittals to Architect/Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Deliver all close-out documents to the Architect within forty-five (45) days of the date of Substantial Completion. Indemnify the Architect for failure to perform this requirement including legal fees incurred by the Architect in enforcing this requirement. Failure to deliver all required close-out documents to the Architect within forty-five (45) days from sign-off of AIA Document G704, "Certificate of Substantial Completion," shall invoke costs of the Architect's services to be borne by the Contractor.
- E. Submit Certificate of Substantial Completion: AIA Document G704, 1992 Edition.
- F. Submit Contractor's Affidavit of Payment of Debts and Claims: AIA Document G706, 1994 Edition.
- G. Submit Contractor's Affidavit of Release of Liens: AIA Document G706A, 1994 Edition.
- H. Submit certification prior to submission of final application for payment attesting that certain products meet Factory Mutual (FM) approval.

#### **1.04 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment. Use experienced workmen or professional cleaners for final cleaning.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site weekly (or more often as required by accumulation). Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off-site at least once a week. Site to be approved by Owner.
- H. Each subcontractor has the responsibility for protecting equipment and finishes at the job site from damages resulting from work under his control, for all cleaning required as a result of his failure to protect equipment and finishes, and for removal of protective covers.
- I. Safety Standards: Maintain project in accordance with the OSHA safety standards, as stipulated under the Occupational Safety and Health Act of 1970 and printed May 29, 1971 in the Federal Register.
- J. Fire Protection: Store volatile waste in covered metal containers and remove from premises daily.
- K. Pollution Control: Conduct cleanup and disposal operations to comply with local ordinances and anti-pollution laws.
  - 1. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.
- L. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
- M. Repair, patch and touch-up marred surfaces to match adjacent finishes. Coordinate with requirements specified under the various sections of these specifications.
- N. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

#### 1.05 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

#### 1.06 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents in clean, dry, legible condition; record actual revisions to the Work:
  - 1. Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, adjusting, maintenance and operation.

- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress. Label each document "Project Record."
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract drawings.
  - 6. Review applied changes to C.A.D. drawings.
- G. Submit documents to Architect/Engineer prior to claim for final Application for Payment.
  - 1. The Contractor shall submit to the Architect one set of "Record" drawings which accurately reflect the actual installation of any and all materials, piping, conduit, etc., which were not installed exactly in accordance with the contract drawings.
  - 2. Contractor shall submit to the Architect two (2) (corrected) final record copies of shop drawings marked "for job use" which reflect all changes required in previous submittals including these marked "Approved as Noted," or similarly revised by the Engineer.

#### 1.07 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8½ x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS."
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on white paper, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/ Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Air and water balance reports.
    - c. Certificates.

- d. Originals of warranties.
- E. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of all document sets as required prior to final submission.
- F. Submit three (3) sets of revised final volumes to Architect/Engineer within thirty (30) days of Architect/Engineer review.

#### 1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

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

#### 1.09 WARRANTIES AND BONDS

- A. Provide notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
- D. Submit one (1) original and two (2) copies prior to final Application for Payment. All such documents shall indicate the name and location of the project and the name of the purchaser.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

Not Used.

END OF SECTION

## **SECTION 02010 - SOILS INVESTIGATION**

The recommendations of Geotechnical Report for the London-Laurel County Speculative Building on Greta Lane (Titled “Lily Industrial Spec Building), Lily, KY, by CETCO, dated September 2, 2022, is incorporated into the requirements of the contract documents and shall be followed in its entirety.

END OF SECTION



September 2, 2022

GEOTECHNICAL REPORT

# LILY INDUSTRIAL PARK SPEC BUILDING

LILY, KY





September 2, 2022

London-Laurel County Economic Development Authority  
Sent % Mr. Glen Ross, PE  
MSE of Kentucky  
via email: glenross@mselex.com

Subject: **Geotechnical Report**  
Lily Industrial Park-Proposed Spec Building and Site  
Lily, Kentucky  
CETCO Project No. 1776-22-0108

Dear Mr. Ross:

**CETCO** appreciates the opportunity to provide our services to you and your project. As follows, we are providing our geotechnical report. Also, please note the report appendix which contains many detailed findings as well as our standard of care for providing our services.

We appreciate the opportunity to provide our geotechnical services to you and the project team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,  
**CETCO**

  
Joseph S. Cooke, P.E.  
Principal  
Licensed KY 21244



Attachments: Geotechnical Report and Appendix





*Cooke Engineering and  
Testing Company*

## **TABLE OF CONTENTS**

<b>SECTION</b>	<b>PAGE</b>
<b>GEOTECHNICAL REPORT SUMMARY</b>	<b>2</b>
<b>1 PROJECT BACKGROUND</b>	<b>3</b>
1.1 CETCO SCOPE OF SERVICES	3
1.2 PROVIDED INFORMATION	3
1.3 PUBLISHED SITE AND AREA INFORMATION	4
<b>2 CETCO FINDINGS</b>	<b>6</b>
2.1 CURRENT SITE SURFACE CONDITIONS AND OBSERVATIONS	6
2.2 SUBSURFACE INFORMATION SUMMARY	11
<b>3 OPINIONS AND DISCUSSION</b>	<b>12</b>
3.1 PRIMARY GEOTECHNICAL ISSUES	12
<b>4 RECOMMENDATIONS</b>	<b>16</b>
4.1 SITE PREPARATION	16
4.2 EARTHWORK	17
4.3 CUT/FILL SLOPES	20
4.4 SITE SEISMIC DESIGN	21
4.5 FOUNDATIONS	21
4.6 FLOOR SLABS	22
4.7 PAVEMENT AREAS	22
4.8 POST-REPORT GEOTECHNICAL CONSULTING	24
<b>5 NOTES ON THE REPORT</b>	<b>24</b>
<b>APPENDIX</b>	<b>26</b>

# Lily Industrial Park-Proposed Spec Building and Site

## LILY, KENTUCKY

### GEOTECHNICAL REPORT SUMMARY

**W**e provided our services in general accordance with our previous discussions and our proposal number 1776–0159, dated August 11, 2022 and approved by the London-Laurel County Economic Development Authority on August 12, 2022. CETCO has consulted with Mr. Glen Ross, PE, of MSE and discussed the need for CETCO to provide geotechnical services including sampling and exploration with soil test borings, a site visit by our office, lab testing and analysis, review of project drawings and providing a geotechnical report. These services included providing our opinion of the conditions encountered for the purpose of design and construction of a new “spec building”, associated building pad area, drives, and the overall site as part of the Lily Industrial Park. The site is about 39 acres in size and a large area (>300,000 square feet) has previously been graded “flat” over the central portions of the site. The proposed new “spec building” will be about 105,000 square feet in size and will be located in this flat area. This introductory section, which has previously been discussed with your office, provides a brief summary for quick reference. The report that follows provides much greater details for design and construction purposes.

In general, our borings were located over the flat area of the site and we also drilled on a portion of the adjacent hillside for potential borrow soil sampling. In the flat area, we encountered previously placed fill overlying native clayey soils overlying shale and sandstone bedrock. No fill was observed in the adjacent hillside area.

Where sampled, the fill consisted of a mixture of orange brown, brown and gray clay soils with variable amounts of shale/sandstone rock. This fill appears to be become more rocky toward the north and east sections of the flat area. The fill was at least 6 feet thick on the western portions, thickening to over 14 feet thick on the east, northeast and southeast areas. Based on our borings and surface observations, the rocky material includes mostly sand, gravel and cobble sized materials, but areas of large boulders are likely. Reportedly the larger boulder material could consist of some concrete derived from the development of the “Aisen facility”. Most of the fill was reportedly placed about 20 or more years ago. No debris was encountered in our borings. The underlying native clay soils were about 6 to 9 feet thick and were generally brown and orange brown silty lean clay. The bedrock at the site was mostly shale or sandstone at our drilling locations. The depth to bedrock was about 15 to over 20 feet deep over most

locations, but the northwestern area borings near the base of the hillsides were as shallow as 13 feet or so to bedrock. The hillside area was about 9 feet deep to the top of bedrock at our one boring location. One boring (B-6) encountered wet conditions at about 15 feet deep. Wet conditions are common in the area, but are typically found near swale/valley areas, isolated springs, at the bottom of previously placed fill masses and near the bedrock surface.

For the proposed Spec Building, we believe shallow spread footings are suitable for support on stiff or better native or fill soils. **However, the foundation excavations should be observed and verified as directed in our report.** Slab-on-grade floors and “normal” pavement thickness should also be suitable.

Our concerns for development include: potential larger boulders/rock in the previously placed fill zones, potential voids in the more rocky sections of the existing fill, and potential wet conditions. These, along with other issues, are discussed in-depth in the following report.

## 1 PROJECT BACKGROUND

### 1.1 CETCO SCOPE OF SERVICES

Our scope of services included review of provided drawings, exploration of the proposed spec building and overall flat portion of the parcel with soil test borings at select locations and laboratory testing and geotechnical analysis. After we completed our reviews, field work and laboratory testing, we are issuing this geotechnical report as follows.

### 1.2 PROVIDED INFORMATION

We were provided information for the project as follows:

Provided Document	Source
Site drawings of property boundaries and topographic information of a LiDAR survey of the site.	MSE.
Drawing showing the potential spec building location on the site, existing topographic information and labeled properties.	MSE.

(this space intentionally blank)

The following information summarizes our understanding of the project conditions

Condition	Specifics
Building/Structure Information	Rectangular shaped building with a structural steel framework. The footprint will be about 105,000 square feet. Floor slab areas are sometimes “left open”/bare gravel, but typical medium to heavy duty industrial concrete slabs are also possible.
Site Grading	The main building area is likely within a few feet from finished sub grade. Additional fill may be required for final grading at various areas on site.
Foundation Loading and Floor Loading	Assumed to be: 150 kips maximum isolated foundation loading and maximum 4 kips per linear foot for any grade beam (wall loading). Floor slab loading: for the near future the area could be bare gravel and unloaded <u>OR</u> medium to heavy duty concrete slabs placed could have warehouse area loads of typically at least 500 pounds per square feet.

If any of the aforementioned information is incorrect or requires modification, please let CETCO know. Changes to our reporting, recommendations and opinions may be required.

### **1.3 PUBLISHED SITE AND AREA INFORMATION**

We have reviewed the following published/public domain site information.

#### **AREA TOPOGRAPHY AND PHYSIOGRAPHY**

The site is located in the southwestern section of the “Eastern Kentucky Coal Field” physiographic region of Kentucky. The Eastern Kentucky Coal Field is part of a larger physiographic region called the Cumberland Plateau (which extends from Pennsylvania to Alabama). The western edge of the Eastern Kentucky Coal Field (and Cumberland Plateau) is also called the Pottsville or Cumberland Escarpment. This escarpment (in large part) is formed from resistant Pennsylvanian-age sandstones and conglomerates. The escarpment is stepped

in south-central Kentucky because several thick, resistant sandstones are separated by less resistant shales. The manner in which the sandstones weather and are eroded along the escarpment results in sheer cliffs, steep-walled gorges, rock shelters, waterfalls, natural bridges and arches. The Laurel County area of the escarpment (at and near the site) also forms “small plateau” and “small valley stream” plots of land.

### **SITE GEOLOGY**

The Kentucky Geologic Survey public information was reviewed including the USGS Lily Geologic Quadrangle. The site is underlain by the Breathitt Formation, with a small section of the site being in Alluvium. The Alluvium appears to be confined to the northeastern/eastern edge of the site along an unnamed stream. The Alluvium is typically less than 20 feet thick along these smaller streams and consists of mostly sand, silt and clay soils with some gravel and small cobbles. The Breathitt unit mapped at the site is specifically the zone between the Little Blue Gem and Lily Coal beds and is mostly shale with siltstone and sandstone bedrock. These bedrock layers are typically gray, yellowish and light brown in color. Coal mining activities in the area are usually limited to “strip” (contour) mining and auger mining due to relatively inconsistent and/or thin coal seams. Available mapping in the area suggests that permits have been issued in the areas south of the site and consists of “surface truck coal” (strip/contour mining or auger mining). The USGS mapping shows auger mining to the southeast and east of the site (across the Laurel River on the east side of US25). Risks for mining activities at or immediately adjacent to the site appear to be minimal.

### **SITE SOIL SURVEY MAPPING**

The Soil Survey of the site area was also reviewed. Issues affecting the site development included: depth to saturated zone (shallow wet conditions), shrink-swell of soils, low soil strength for slopes and silty soils. We are providing recommendations to address these issues. The mapping also suggests a “high risk” for corrosion of both steel and concrete due to soil/subsurface conditions in the area. No corrosion and/or pH testing was performed by CETCO, but the project conditions typically most affected by such risks are floor slabs and foundations. Usually, the means to address such risk include having at least 3 inches of “protective” concrete cover over reinforcing steel. Such amounts of cover also serve as a “sacrificial” concrete to ultimately protect the integrity of the greater portion of the concrete section.

## **RECENT AND CURRENT PUBLISHED AERIAL MAPPING**

Aerial information back as far as 1997 were readily available for the site. From about 2004 to the present, the conditions observed on site and on aerial mapping appear to be very similar. Most likely, the adjacent Aisen facility construction (from 1997-1998) and the water tank on the north (shortly thereafter) are the primary “changes” (including the fill from Aisen) that occurred to the site and site boundary properties.

## **2 CETCO FINDINGS**

We provided a site and area reconnaissance, logged soil test borings and explored the site using those borings. The following sections discuss our findings. Mr. Joe Cooke, PE, provided our field services during the exploration on August 22, 2022.

### **2.1 CURRENT SITE SURFACE CONDITIONS AND OBSERVATIONS**

The site is a rectangular property with the long sides being on the northeastern and southwestern compass directions and the narrow sides being the northwestern and southeastern. The overall building pad area is a mostly grassy “flat” area that extends over most of the central area of the site and most of the southwestern boundary. A moderate upward grassy hillside is present along the north and northwestern edge of the site. On the northeastern, eastern and southeastern sides of the flat area, a moderate downward, grassy slope is present. Beyond this slope, additional flat areas are present in the low-lying regions of the site on the northeastern and southeastern boundaries. Wooded/densely vegetated areas are present along the entire northeastern boundary including the northeastern side of the flat area. Several small wooded swales are also present on the northeast, east and southeast areas of the site, especially in the low-lying areas.

The flat area where the proposed spec building will be located has a small drainage ditch at the northwestern edge at the toe of the hillside. The central sections of the flat area has minimal grass cover and mostly has exposed soil and gravel with some cobbles and small boulders at the ground surface. The overall ground surface at the time of drilling was very firm, but a few areas of rutting occurred as our drilling equipment traversed the site. We also observed a small area of some “drop outs” and small “divots” on the northwest/western edge of the flat area. Lastly, several areas of some surface debris were observed, especially on the northeast edge/downward slope area. This area also had very rocky conditions at the slope surface. This included concrete pieces as well as boulders. The slope edge also had several significant cracks (scarps) where the upper section of the slope appears to have moved. The following pages show photos at the site at the time of our field work.



## Project Photos

Description	Photo
<p>View of most of the site, as seen from the higher elevations. Facing southeast.</p>	
<p>View of most of the flat area. Shows both grassy portions and bare/exposed ground portions. Facing east.</p>	



**Project Site Photos (cont.)-1**

Description	Photo
<p>Showing example large boulder/large piece of concrete at the ground surface in the flat area.</p>	
<p>Large boulder at the ground surface near the edge of the flat area.</p>	





## Project Site Photos (cont.)-1-1

Description	Photo
<p>Showing scarps and rocky ground cover near the northeast edge of the flat area.</p>	
<p>Grassy slope on the southeast edge of the flat area. Facing southwest.</p>	



## Project Site Photos (cont.)

Description	Photo
<p>Example view of very rocky conditions on the northeast slope of the flat area with some debris at the surface.</p>	
<p>View of "depressions" or "divots" at the southwest corner of the flat area.</p>	

## 2.2 SUBSURFACE INFORMATION SUMMARY

A total of 8 borings were utilized to explore the subsurface conditions at the site. Seven were drilled in the flat building pad area and one was drilled in the hillside area above the pad.

**SUBSURFACE CONDITIONS:** At the seven flat area borings, we encountered similar conditions in each boring. This included a surface layer of previously placed fill, over native clayey soils, over shale/sandstone bedrock. The table below shows additional details of each layer.

The boring in the potential borrow area/hill side area above the flat pad did not have previously placed fill cover, but was overlain by natural soils which extended down about 9 feet to shale/sandstone bedrock.

More detailed findings are in the appendix boring logs and laboratory testing pages.

### Building Pad Area: Summary of Subsurface Conditions

Strata	Thickness	Notes
Previously Placed Fill: A mixtures of clayey soil and shale/sandstone. The shale/sandstone appeared to be mostly gravel and cobble sized material. Borings on the eastern half seemed to be more rocky.	About 6 to 13 feet thick: average thickness is likely about 10 feet.	Boulders as large as 3 to 4 feet wide were observed in a few locations at the ground surface. Some rocky zones were observed in some of the borings as well.
Native Soils: Orange brown lean clay, silty, moist to very moist. Generally stiff to very stiff.	About 10 to 15 feet	Wet conditions were encountered at 15 feet deep in boring B-6
Bedrock Conditions: Mostly shale or sandstone	NA	Boring B-6 was terminated at 20 feet without encountering bedrock.

Auger refusal was achieved in 7 of the 8 borings. Depth to refusal was as shallow as 10 feet. The refusal depths were likely on top of the bedrock surface, which was mostly shale or sandstone bedrock.

**GROUNDWATER CONDITIONS:** We encountered wet conditions/free water in only one boring (at 15 feet deep in boring B-6). However, wet conditions should be expected near the bottom of the previously placed fill layer, within isolated pockets within the fill mass and near the bedrock surface. Areas at or near swales, low-lying areas and ditches should also expect wet conditions.

## 3 OPINIONS AND DISCUSSION

SUMMARY: In general, the project site is suitable for the proposed building construction and associated site features. This includes the use of shallow spread footings and slab-on-grade floors.

### 3.1 PRIMARY GEOTECHNICAL ISSUES

The following issues are our opinion of the primary geotechnical-related issues at the site. Other issues are likely present, but we believe the following represent the greatest impact to the project budget, schedule, design and construction. Our recommendations address these issues.

- Previously Placed Fill
- “Rocky” foundation/trench construction issues
- Groundwater, site drainage and construction over former swale areas
- Existing rocky filled slope area
- Low-lying areas

#### **Previously Placed Fill**

Previously placed fill overlays the proposed building pad area. The fill was from about 6 to 13 feet deep at our boring locations. The fill was placed at least 20 years ago and the material was likely derived from the adjacent Aisen facility construction. We were not provided with any testing/documentation of the fill material placement, compactive effort or quality control measures. However, we were informed that the fill was observed as part of the overall Aisen construction, which was reportedly “inspected” during construction.

Where sampled, the material was generally a mixture of soil and bedrock materials. However, some concrete pieces and some debris were observed at the ground surface. **Test pits are needed to further evaluate the average consistency/material types in the fill mass.** Due to the age and relatively “thin” thickness of the fill mass, we do not believe overall total settlement is a concern with the fill mass. Isolated differential settlement could be a concern, this is especially the case in more “rocky” areas. Several “drop outs” (depression/divot type holes) were observed on the northwestern area of the flat zone in this fill mass. From aerial



photos, this area was very rocky (boulders and cobbles) and was later covered with soil. The soil has likely washed into the rocky void spaces. These rocky zones could be present in various areas and appear to be located on this northwest corner area and on the northeast area of the flat zone.

We believe shallow spread footings can be used for the proposed spec building. Our borings did not cave-in during drilling and SPT blow counts were relatively consistent, which are both indicative of “uniform” conditions as well as some indication of likely “stable” conditions. However, **in-depth foundation excavation and individual footing bearing capacity testing during construction is needed** to verify this initial assessment. Again, test pits are recommended to better explore this fill material.

Please note: If any equipment loads or column loading exceed 150 kips, deep, rock-bearing foundations should be used.

Lastly, it should always be noted that if the undocumented previously placed fill contains areas of debris or deleterious materials (especially organic materials), significant settlement may occur when the material is “loaded”.

#### **“Rocky” Foundation/Trench Construction**

We observed areas of cobbles and boulders at the ground surface and very rocky surface conditions along the northeastern area of the flat zone. Any excavations into rocky material can be difficult, slow and expensive. Foundation excavations will be irregular and require over-excavating/additional concrete. Trenches will require the use of trench-boxes. Any excavation left open will also tend to slough and will require re-excavation or “flattening” of excavation sides.

#### **Groundwater, site drainage and construction over former swale areas**

We observed water in one boring at 15 feet deep. Also, our experience in the area, as well as the soil survey mapping, suggest shallow water is likely at the site. This is especially the case at or near the bottom of the fill mass, within more rocky areas of the fill mass, at or near the bedrock surface and at or near existing or “filled” original swale areas.

The site drainage ditches appear to be maintained adequate site drainage. However, we recommend deepening/expanding the existing diversion/bottom ditch at the toe of the hillside above (west/northwest of) the flat area. New buildings/pavement areas tend to create more

surface drainage or the new disturbance could likely uncover springs or other water bearing formations.

Lastly, the figure below shows at least two original swale areas. The dash line is a swale area that was filled. The solid line is a swale that was filled on the western section and remains open/daylights in its original position on the southeast/east. Swales in Laurel County are noted for spring formation and wet/soft soil conditions. The proposed spec building appears to be placed well-outside the areas. Future development should note that soft/wet conditions are likely in the original swale locations and deep, rock-bearing foundations are likely needed to avoid excessive foundation settlement.

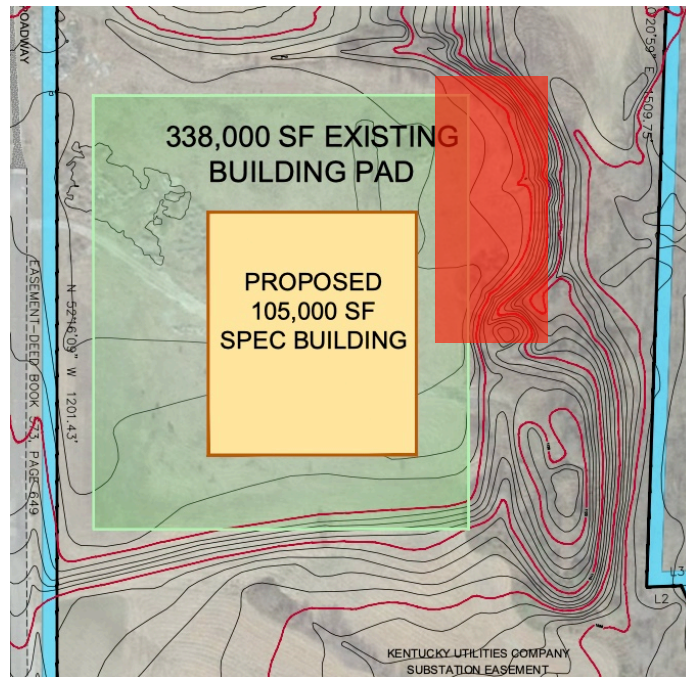


Figure showing existing site conditions with original swale locations (yellow dashed line and yellow solid line)

### **Existing rocky filled slope area**

Most of the existing fill slope areas are either grass covered or otherwise densely vegetated and they appear to be “stable”. However, the northeastern filled slope area is very steep, rock-covered and has several “scarps” at the crest of the slope. Scarps are cracks that are indicative of some slope movement (i.e., some instability). The scarps are not present past about 20 feet from the crest of the slope. We are recommending to avoid development within 50 feet of this slope crest area, unless the area is re-graded, the slope is flattened and the

material is re-compacted and then judge suitable by a geotechnical engineer. See the image below (on the next page) for the area in question (red shading).



Site plan: Red shading shows the steep rocky slope area and slope crest area.

### **Low-lying areas**

Low-lying areas border the eastern, northeastern and southeastern areas of the site. These areas are very wet and soft. Construction in the areas will require a great deal of stabilization measures. Also, the small ditch area along the north/northwestern edge of the flat zone is soft and would be considered a relatively low-lying area (compared to the entire plateau). Some soft and wet soil conditions were also observed in this area.

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## 4 RECOMMENDATIONS

The following recommendations are provided to assist in the planning, design and construction of the project.

### 4.1 SITE PREPARATION

We recommend that site grading should take place between about late April to early November. Earthwork taking place outside this time period will likely encounter wet conditions and weather conditions that will provide little to no assistance with drying the soils. Additionally, the following bulleted items are critical to prepare the site for earthwork and additional construction.

- Topsoil and organic materials should be removed (stripped) from the construction area and all structural fill areas. These materials should be wasted from the site or used as topsoil in landscape areas;
- Areas ready to receive new fill should be proofrolled with a loaded dump truck or similar equipment judged acceptable by CETCO. Soils in low-lying areas (including the ditch on the northern edge of the upper flat zone) will not pass a proof roll. We should be contacted to observe any proof roll in these low-lying areas or the ditch area to deem what are acceptable conditions;
- Also, the entire flat zone was previously filled. We recommend a heavy, in-depth proof roll of this entire area, especially the new spec building footprint. This can serve as additional verification of the upper stability of this pad;
- Proofrolling should not be performed on wet subgrade. If possible, perform proof rolls after suitable dry weather periods of time;
- CETCO should determine amounts of undercutting (if any) for any area which pumps or ruts. CETCO should also determine acceptable backfill materials and backfill methods. In general any backfill should be accomplished in general accordance with section 4.2;
- Remove deleterious materials or materials that are unsuitable for use in supporting the overlying new fill. The backfill should be consistent with the requirements listed in section 4.2;
- CETCO should observe the proofrolling operations and make recommendations for any unstable or unsuitable conditions encountered.



## 4.2 EARTHWORK

Before new fill construction, representative samples should be obtained of the proposed fill material to determine the moisture-density and overall classification of the material. The tests also would assist in determining if the material is suitable for use as structural fill.

After the subgrade has been approved to receive new fill, the fill may commence with the following procedures and guidelines recommended:

### **Mass Earthwork**

- Based on our observations and laboratory testing, the on-site soils appear to be suitable for use as structural fill, this include the upper hill side materials;
- The soils are mostly clay, but are considered to be very silty and contain mostly small amounts (with higher amounts in areas) of sand. These types of soils can compact very well in our experience, but any silty soil can destabilize, especially in wet conditions. Further, sandy soils can tend to have “pocketed” water, which can drain well but destabilizes quickly when wet. Care should be taken to allow soils to dry after periods of wet weather/rain prior to new fill placement;
- Rock and soil mixtures will be present in areas of the site, especially in the existing fill mass. **New fill with rock and soil mixed should be placed and treated like soil fill and is not to be considered a rock fill.** A sheepfoot roller should be used to compact the fill and the following fill guidelines should be used for both rock-soil mixtures and cleaner soil;
- Fill placement guidelines:
  - Structural fill should be placed in maximum 8-inch thick loose lifts;
  - Maximum particle size of the soil should be limited to 12 inches in any dimension;
  - Larger rock pieces should be pulverized/broken down to meet this particle size requirement or segregated and placed outside of new structural fill;
  - Materials should have a plasticity index (PI) of less than 30.
- Quality control testing guidelines:
  - Density testing should be performed at a frequency of no less than 3 tests per lift and at least one test per 10,000 square feet. Soils should be compacted to a least 98% of the soil’s maximum dry density (standard Proctor ASTM D698);

- For rock-soil mixtures, density testing may not be practical due to the variability of rock in the materials. In that case, the stability should be judged by proof rolling each lift, sheepsfoot “walking out” of each lift and adequate moisture of the fines;
- Moisture testing of soil fill and the finer materials of the rock-soil mixtures should be performed as additional verification that the materials are not placed with “wet soil/ fine” material portions. Also, soil should not be placed “dry”. Soil moisture should be placed with soils between plus two to minus two percent of the soil’s optimum moisture content (again, standard Proctor ASTM D698);
- CETCO should observe fill placement to determine acceptable soil moisture;
- Observation of fill “stability” is critical. The roller and earthwork equipment traversing over the new fill should be observed to document minimal movement occurs. This includes sheeps foot roller action observed to ensure the compactor is “walking out” of each lift;
- CETCO should observe and document fill placement and compaction operations.

### **Backfill Construction**

These materials are placed in more confined areas than mass earthwork materials and therefore cannot be placed in full compliance with the previous recommendations. The following are general recommendations for backfill areas:

- Fill lift thicknesses will vary dependent on compaction equipment available and material types, but in no case should exceed 8 inches;
- For crushed stone/aggregate backfills in trenches or wall backfill and when using smaller compaction equipment (such as a plate compactor or trench compactor or similar) the lift thickness should not exceed 4 inches;
- Observation of stability and moisture should be similar to those mentioned previously;
- CETCO should provide addition recommendations for backfill.

**For all earthwork:** Again, we recommend that site grading be started in the period from about late April to about November in order to prevent additional undercutting due to wet conditions. Drying of the site soils during other portions of the year is typically difficult.

(this space intentionally blank)

## **Site Drainage**

Site drainage (water flow into, along and from the site) is key to minimize damaging effects of the water flow. Excess water ponding can destabilize soils. Excessive water flow can erode soils and destabilize soils, especially at or near slopes.

For groundwater seepage, the water encroaching upon construction excavations can be removed by placing a sump near the source of seepage and then pumping from the sump. Should heavy seepage occur, or should there be evidence of soil particle migration such as silting of the sump, then the geotechnical engineer should be contacted.

The following are general guidelines for site drainage.

- For all earthwork operations, positive surface drainage is prudent to keep water from ponding on the surface and to assist in maintaining surface stability;
- The surface should be sealed prior to expected wet weather. This can usually be accomplished with rubber-tired construction equipment or a steel-drum roller;
- During construction, water should not be allowed to pond in excavations or undercutting will likely be required;
- During the life of the project, slope the subgrade and other site features so that surface water flows away from the site structures;
- Future building structure roof drains should be piped away to proper storm drainage systems;
- Diversion ditches should be used at the toe of all slopes to keep surface water from accumulating at or near site structures. **The existing ditch at the toe of the slope above (the west/northwest edge) the flat area should be widened/deepened to improved drainage;**
- For excavations during construction, most free water from the subsurface conditions could likely be removed via sump pumps and open channel flow (ditches) at or near the source of seepage. However, if normal dewatering measures prove insufficient, CETCO should be retained to provide recommendations on the issue;

(this space intentionally blank)

## 4.3 CUT/FILL SLOPES

For general new slope construction, we recommend the following as maximum limit.

### General Maximum Allowable Slope Grading

Material	Slope Type	Steepest Permanent Slope
Soil	Cut or Fill	2H:1V*

\* For mowing and maintenance considerations a 3H:1V or flatter slope may be more desirable.

The following are general slope construction guidelines:

- Any area within 10 horizontal feet of a structure should be constructed flat (minimal sloping to allow some surface water drainage away from the structure);
- Toes of slopes should have drainage ditches directing water away from the areas;
- For areas wider than 20 feet above the top of slopes, we recommend installing lined/impervious diversion ditches to redirect surface water away from the fill slope surface;
- Compaction of soil fill near the edge of a slope is generally difficult due to poor confinement. We recommend fill slopes be constructed steeper than the above recommendations and then cut the resulting slope back to the design slope;
- Fill placed on side slopes must be placed in horizontal lifts starting at the toe of the slope while securely benching the new fill material into the existing slope. Continue to place the fill in horizontal lifts until final proposed grade is reached;

Guidelines for construction of cut soil slopes are not practical because of unpredictability of the natural soil strata changes and relative differences in soil strengths within very short distances. Also, water drainage in the natural soil mass is irregular. CETCO should be retained at the time of construction to provide guidance on cut soil slope construction.

**Again, the existing slope on the northeastern edge of the flat area appears to have “moved” and is very steep. New development within 50 feet of the crest should be avoided.**

## 4.4 SITE SEISMIC DESIGN

The Kentucky Building Code (KBC), as updated was reviewed to determine the Site Seismic Classification. Based on our review of geologic data, our experience, and subsurface conditions encountered, we recommend a Seismic SITE CLASS "D" for the site.

A detailed geotechnical earthquake engineering analysis was not performed. However, based on a review of published literature and our experience with similar subsurface conditions, we believe the potential for slope instability, liquefaction (sandy soils at the site are very clayey), and surface rupture due to faulting or lateral spreading resulting from earthquake motions is low.

## 4.5 FOUNDATIONS

The following recommendations are also based on the previously described project information, typical industrial building types, the subsurface conditions encountered in the borings, the results of laboratory testing, empirical correlations for the soil types encountered, and CETCO's analyses and experience.

The site conditions can likely support the new spec building if the maximum foundation loading is less than 150 kips. Heavier loading should use deep, rock-bearing foundations.

A maximum allowable net bearing pressure of 2,000 pounds per square foot (psf) is recommended for footings bearing on stiff or better native soils or existing fill. Additional design considerations for project foundations are outlined as follows:

- Design footings with a minimum dimension of 24 inches wide;
- Place all exterior footing bottoms to at least 28 inches below finished exterior grade;

### Shallow Foundation Construction Considerations

The soils encountered in this exploration may lose strength if they become wet during construction. Therefore, we recommend the foundation subgrades be protected from exposure to water. The following guides address protection of footing subgrades and our recommended remediation for any soft soils encountered.

- **Again, due to the existing fill being "undocumented", a detailed assessment of bearing conditions must be conducted on each foundation. Dynamic cone penetration (DCP) and hand auger borings must be used at all footing locations and the testing extended to a depth of at least 2 times the footing width below the planned bottom of footing.**

- To protect against “moisture loss” or “soil drying” during warmer months, foundation concrete should be placed the same day as excavation.
- Remove any soils disturbed by exposure prior to foundation concrete placement.
- Level or suitably bench the foundation bearing area.
- Remove loose soil, debris, and excess surface water from the bearing surface prior to concrete placement.
- In more rocky areas of the existing fill mass, excavations will be difficult and irregular. Forming the footing or “additional” concrete would be required.
- CETCO must observe all foundation excavations and provide recommendations for treatment of any unsuitable conditions encountered.

## **4.6 FLOOR SLABS**

Normal conventional industrial type slabs can be supported by the existing fill soils or native soils. **The areas should be heavily proof rolled for further evaluation of the pad.** The subgrade should be prepared according to the recommendations contained within this report. The following features are recommended as part of the floor slab construction:

- If possible, avoid construction of slabs during the hottest/driest months (typically July, August or September) due to potential “dry soil” conditions.
- Keep the crushed stone or gravel moist, but not wet, immediately prior to slab concrete placement to minimize curling of the slab due to differential curing conditions between the top and bottom of the slab.
- Retain CETCO to review the actual subgrade conditions prior to slab construction and make recommendations for any unsuitable conditions encountered.

## **4.7 PAVEMENT AREAS**

Our laboratory testing indicates the silty clay soils on-site have a CBR of about 4. We have also assumed a 15 year life with a typical “industrial pavement” EAL count. The most significant areas of traffic are the main entrances and main intersections of the parking lot.

### **Pavement Area Subgrade Recommendations**

Adequate soil/subgrade support is critical for any pavement area. Please refer the Earthwork section of this report for subgrade preparation. Prior to stone base placement we recommend

an additional proofroll of the subgrade should be performed to verify subgrade conditions. Recommendations for undercutting/repair of the subgrade can be made at that time by CETCO.

### **Pavement Drainage**

Adequate drainage and slope of the pavement subgrade and pavement section should be provided to promote adequate drainage. Edges of the pavement should be provided a means of water outlet by extending the aggregate base course through to side ditches or providing drain pipes and weep holes at catch basin walls.

### **Light Duty Parking**

Based on the above traffic and design parameters and our experience with similar projects, we recommend using the following pavement section for passenger vehicle parking lot areas:

#### **Parking Pavement Sections**

<b>Component</b>	<b>Parking Lots Only</b>
Surface Course	1
Asphalt Base Course	2
Base Material (DGA)	8

### **Heavy Duty Pavement**

For entrances, main roads, main drives and all tractor trailer truck areas, we recommend the following pavement section:

#### **Heavy-Duty Pavement Sections**

<b>Component</b>	<b>Parking Lots Only</b>
Surface Course	1
Asphalt Base Course	3
Base Material (DGA)	8

All asphalt should be mixed, placed, and compacted in accordance with Kentucky Transportation Cabinet Standard Specifications. Also, the dense graded aggregate (DGA) should be placed and compacted in accordance with KyTC Specifications.

**Dumpster Areas, Truck Turnaround and Loading Docks**

Any dumpster pad, dumpster unloading area, heavy truck turnaround and loading docks should be concrete pavement. At least 6 inches of concrete thickness should be used overlying at least 6 inches of compacted DGA base stone.

**4.8 POST-REPORT GEOTECHNICAL CONSULTING**

CETCO services as “geotechnical engineer of record” include answering questions pertaining to the materials presented in this report and the appendix. However, if conditions arise during construction that are different than those encountered during our exploration or if additional recommendations are needed, CETCO should be retained to provide that guidance. Construction observation and testing are beyond the typical scope of the geotechnical engineer, but are essential to completing the geotechnical engineer’s anticipated completion of their recommendations. CETCO should always be contracted as the testing/inspection firm for any project that applies their geotechnical report information. This always saves time, risk and project costs.

**5 NOTES ON THE REPORT**

The assessment of site environmental conditions or the presence of contaminants in the soil, rock, surface water or groundwater of the site was beyond the scope of this exploration.

The recommendations provided are based in part on project information provided to us and they only apply to the specific project and site discussed in this report. If the project information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. We can then modify our recommendations if they are inappropriate for the proposed project.

Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between borings/test pits will be different from those at specific boring/test pit locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created.



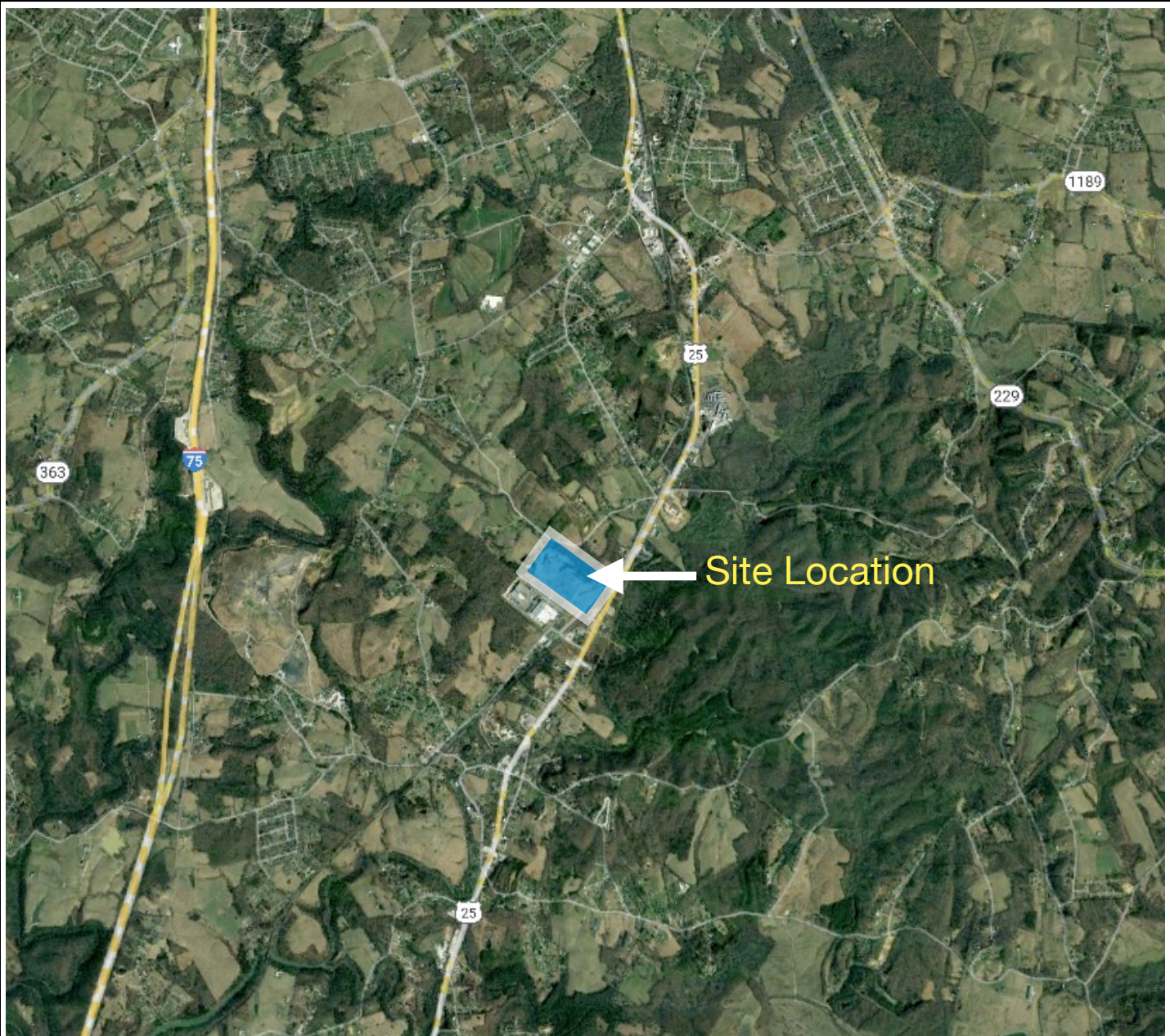
We recommend that the owner retain CETCO to provide this service based upon our familiarity with the project, the subsurface conditions and the intent of the recommendations.

We recommend that this complete report be provided to the various design team members, the contractors and the project owner. Potential contractors should be informed of this report in the "instructions to bidders" section of the bid documents. The report should not be included or referenced in the actual contract documents.

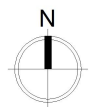
We wish to remind you that our exploration services include storing the samples collected and making them available for inspection for 30 days. The samples are then discarded unless you request otherwise.

# APPENDIX

**SITE LOCATION PLAN  
BORING LOCATION PLAN  
TEST BORING LOGS  
FIELD STANDARDS  
LABORATORY TESTING  
LABORATORY STANDARDS**



Site location plan adapted from Google Earth Pro, with further adaptations from CETCO professionals.

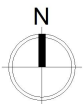
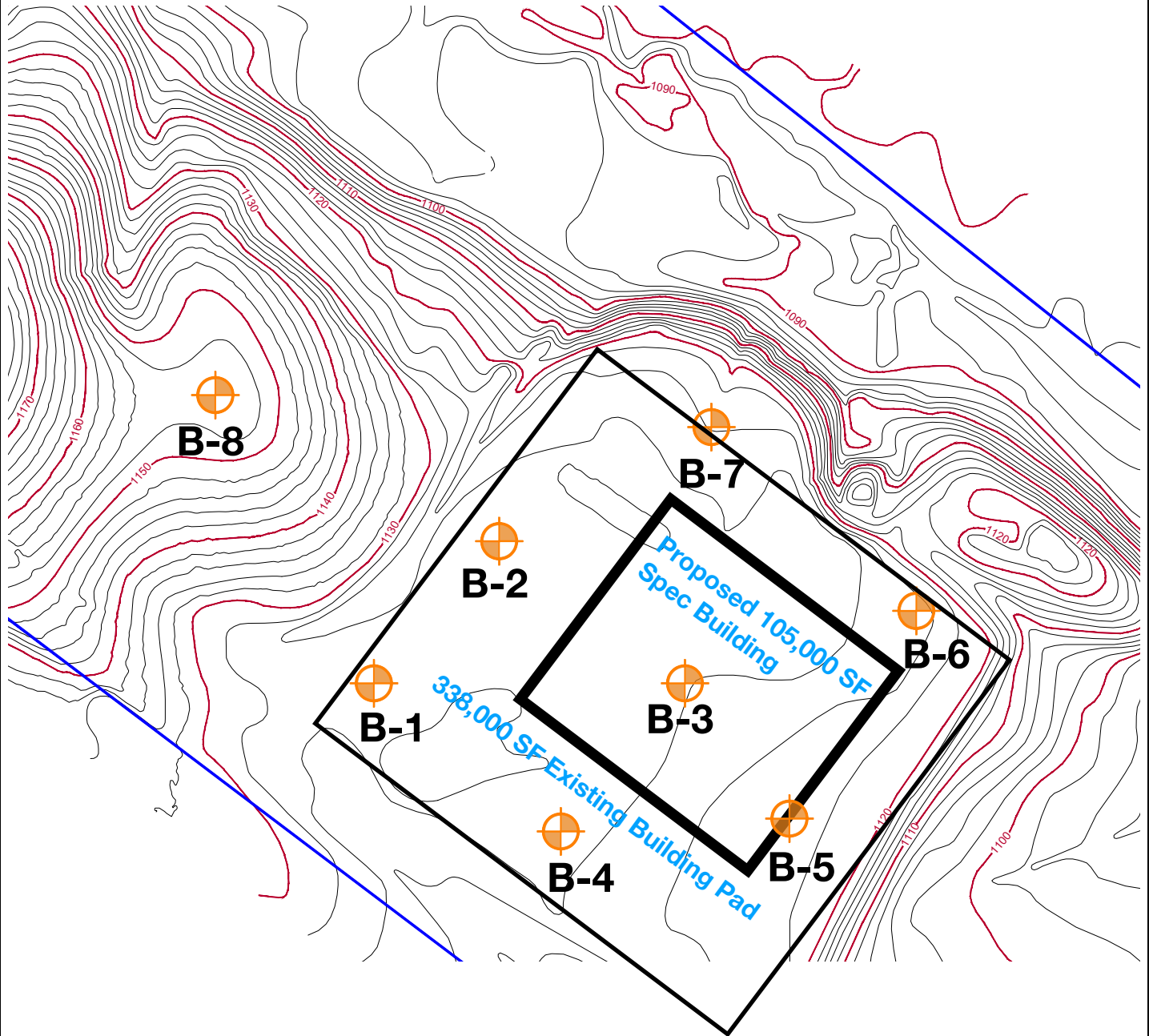


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[www.cetcopllc.com](http://www.cetcopllc.com)

**SITE LOCATION PLAN**  
for  
Lily Industrial Park, Lily, KY

CETCO Project: 1776-22-0108  
Date: August 29, 2022  
Checked by: JSC  
Drawing: 1 of 1





Boring Location Plan adapted from "London Laurel Industrial Lidar" image and "London-Laurel IDA Greta Lane-PDI-8-4-2022-MP" plan provided, with further adaptations from CETCO professionals. Locations are approximate.

### Legend

 **Boring B-X**



CETCO, PLLC  
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www.cetcopllc.com

**BORING LOCATION PLAN**  
for  
Lily Industrial Park, Lily, KY

CETCO Project: 1776-22-0108  
Date: August 29, 2022  
Checked by: JSC  
Drawing: 1 of 1, Scale: NTS



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Lexington, KY 40503  
Telephone: 859-475-3933

# BORING NUMBER B-1

PAGE 1 OF 1

CLIENT London-Laurel County Economic Development Authority

PROJECT NAME Lily Industrial Park

PROJECT NUMBER 1776-22-0108

PROJECT LOCATION Lily, KY

DATE STARTED 8/22/22

COMPLETED 8/22/22

GROUND ELEVATION \_\_\_\_\_

HOLE SIZE 4-1/4" inches

DRILLING CONTRACTOR Strata Group

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY Joe Cooke, PE

CHECKED BY Joe Cooke, PE

AT END OF DRILLING ---

NOTES Cloudy, 70's

AFTER DRILLING ---

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 8/29/22 16:10 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\LILY INDUSTRIAL PARK.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								20	40	60	80
								PL	MC	LL	
0								20	40	60	80
								□ FINES CONTENT (%) □			
								20	40	60	80
		(CL) PREVIOUSLY PLACED FILL: Brown to orange brown LEAN CLAY (CL), silty, with shale and sandstone gravel and cobbles, slightly moist to moist, VERY STIFF into STIFF	SPT S-1	83	7-9-11 (20)						
			SPT S-2	61	9-10-10 (20)						
5			SPT S-3	78	4-3-7 (10)						
		(CL) Orange brown LEAN CLAY (CL), silty, with some sand and gravel, few shale/sandstone pieces, very moist, FIRM	SPT S-4	67	4-2-3 (5)						
		(CL) Orange brown LEAN CLAY (CL), silty, with little sand, very moist, with some shale lenses, STIFF	SPT S-5	100	4-7-7 (14)						
10											
		Gray, black and brown weathered SHALE, slightly moist	SPT S-6	100	6-15-20 (35)						
15											

Refusal at 15.5 feet.  
Bottom of borehole at 15.5 feet.



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# BORING NUMBER B-2

PAGE 1 OF 1

CLIENT London-Laurel County Economic Development Authority

PROJECT NAME Lily Industrial Park

PROJECT NUMBER 1776-22-0108

PROJECT LOCATION Lily, KY

DATE STARTED 8/22/22 COMPLETED 8/22/22

GROUND ELEVATION \_\_\_\_\_ HOLE SIZE 4-1/4" inches

DRILLING CONTRACTOR Strata Group

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY Joe Cooke, PE CHECKED BY Joe Cooke, PE

AT END OF DRILLING ---

NOTES Cloudy, 70's

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								20	40	60	80
								PL	MC	LL	
0								20	40	60	80
								□ FINES CONTENT (%) □			
								20	40	60	80
		TOPSOIL									
		(CL) PREVIOUSLY PLACED FILL: Brown to gray LEAN CLAY (CL), silty, with lots of shale fragments (sand, gravel and cobble), into orange brown LEAN CLAY (CL), silty, with shale and sandstone gravel, slightly moist to moist, VERY STIFF into STIFF	SPT S-1	83	4-9-11 (20)						
			SPT S-2	100	7-6-8 (14)						
5			SPT S-3	78	5-5-8 (13)						
		(CL) PREVIOUSLY PLACED FILL: Orange brown LEAN CLAY (CL), silty, with few shale and sandstone pieces, very moist, STIFF	SPT S-4	78	3-5-5 (10)						
10		(CL) Orange brown LEAN CLAY (CL), silty, with little sand, very moist, with some shale lenses, STIFF to VERY STIFF	SPT S-5	83	5-8-12 (20)						
15			SPT S-6	100	5-4-10 (14)						
		Brown, gray and black weather SHALE, slightly moist	SPT S-7	100	8-50						

Refusal at 19.9 feet.  
Bottom of borehole at 19.9 feet.



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# BORING NUMBER B-3

PAGE 1 OF 1

CLIENT London-Laurel County Economic Development Authority

PROJECT NAME Lily Industrial Park

PROJECT NUMBER 1776-22-0108

PROJECT LOCATION Lily, KY

DATE STARTED 8/22/22 COMPLETED 8/22/22

GROUND ELEVATION \_\_\_\_\_ HOLE SIZE 4-1/4" inches

DRILLING CONTRACTOR Strata Group

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

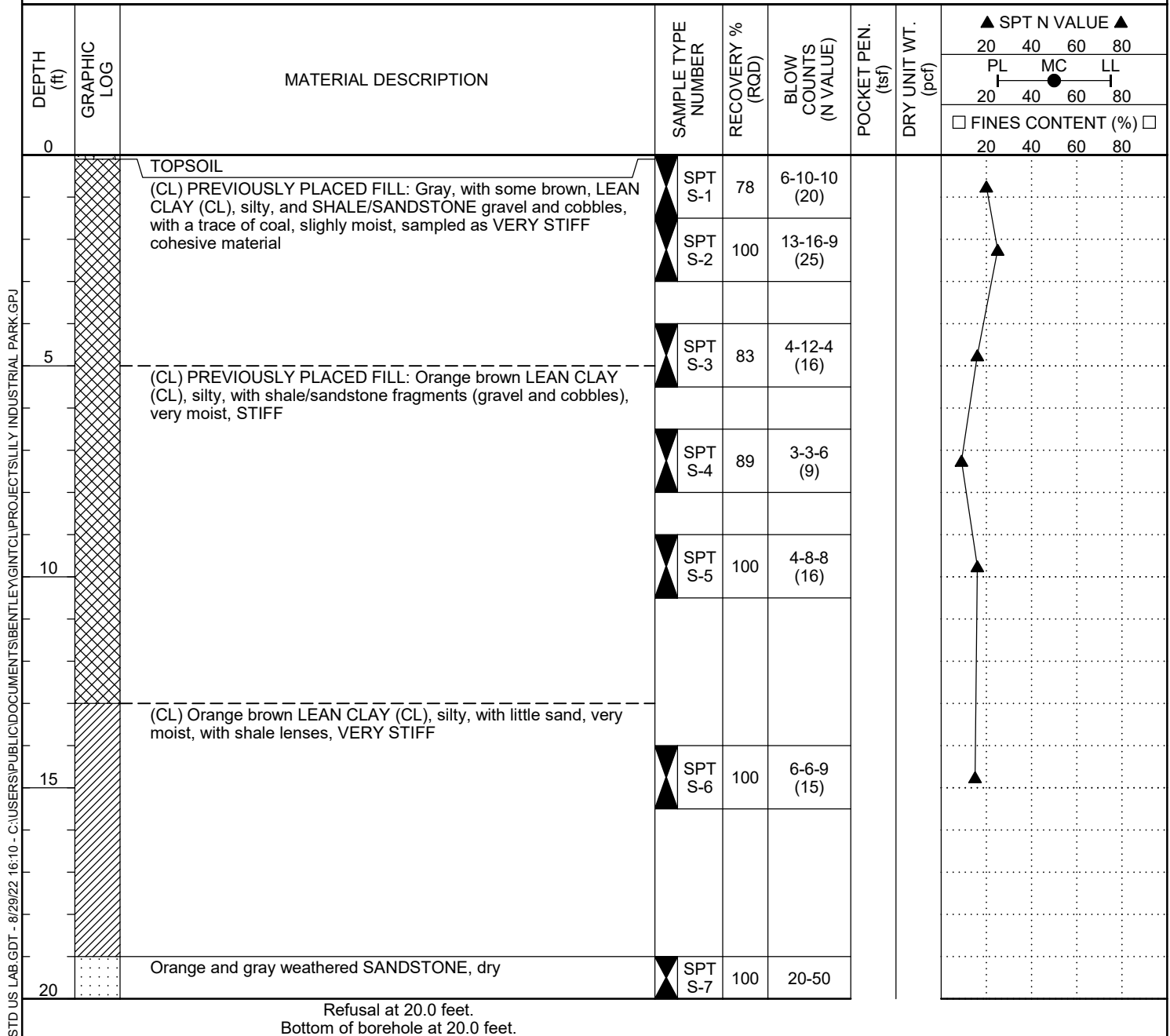
AT TIME OF DRILLING ---

LOGGED BY Joe Cooke, PE CHECKED BY Joe Cooke, PE

AT END OF DRILLING ---

NOTES Cloudy, 70's

AFTER DRILLING ---





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# BORING NUMBER B-4

PAGE 1 OF 1

CLIENT London-Laurel County Economic Development Authority

PROJECT NAME Lily Industrial Park

PROJECT NUMBER 1776-22-0108

PROJECT LOCATION Lily, KY

DATE STARTED 8/22/22 COMPLETED 8/22/22

GROUND ELEVATION \_\_\_\_\_ HOLE SIZE 4-1/4" inches

DRILLING CONTRACTOR Strata Group

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY Joe Cooke, PE CHECKED BY Joe Cooke, PE

AT END OF DRILLING ---

NOTES Pt. Cloudy, 80's

AFTER DRILLING ---

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 8/29/22 16:10 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\LILY INDUSTRIAL PARK.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								20	40	60	80
								PL	MC	LL	
								20	40	60	80
								□ FINES CONTENT (%) □			
								20	40	60	80
0		(GC) PREVIOUSLY PLACED FILL: Gray SANDSTONE/SHALE and LEAN CLAY (CL), silty, with some sand, slightly moist, sampled as FIRM non-cohesive material	SPT S-1	100	13-13-12 (25)						
			SPT S-2	100	15-16-8 (24)						
5		(CL) PREVIOUSLY PLACED FILL: Orange brown LEAN CLAY (CL), silty, with shale/sandstone fragment (gravel and cobbles), moist to very moist, sampled as STIFF cohesive material	SPT S-3	83	4-4-7 (11)						
		(CL) Possible fill: Orange brown LEAN CLAY (CL), silty, with some sand and gravel, very moist, FIRM	SPT S-4	78	2-3-8 (11)						
10		(CL) Orange brown LEAN CLAY (CL), silty, with trace sand, very moist, STIFF	SPT S-5	100	5-6-8 (14)						
		(SC) Brown to orange brown SANDY LEAN CLAY (CL), silty, very moist, FIRM	SPT S-6	100	3-4-3 (7)						
15		Gray weathered SANDSTONE									

Refusal at 17.5 feet.  
Bottom of borehole at 17.5 feet.



**CLIENT** London-Laurel County Economic Development Authority

**PROJECT NAME** Lily Industrial Park

**PROJECT NUMBER** 1776-22-0108

**PROJECT LOCATION** Lily, KY

DATE STARTED 8/22/22

**COMPLETED** 8/22/22

### GROUND ELEVATION

**HOLE SIZE** 4-1/4" inches

**DRILLING CONTRACTOR** Strata Group

**GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ----

**LOGGED BY** Joe Cooke, PE

**CHECKED BY** Joe Cooke, PE

AT END OF DRILLING \_\_\_\_\_

**NOTES** Pt. Cloudy, 80's

**AFTER DRILLING**     

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲
								20 40 60 80
								PL MC LL
								20 40 60 80
								☐ FINES CONTENT (%) ☐
								20 40 60 80
0		TOPSOIL						
		PREVIOUSLY PLACED FILL: Mostly gray in color, very rocky (likely SANDSTONE gravel and cobbles with some boulders), slightly moist to very moist						
5								
10								
15		(CL) Brown LEAN CLAY (CL), silty, moist						

Refusal at 17.5 feet.  
Bottom of borehole at 17.5 feet.



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Lexington, KY 40503  
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# BORING NUMBER B-6

PAGE 1 OF 1

CLIENT London-Laurel County Economic Development Authority

PROJECT NAME Lily Industrial Park

PROJECT NUMBER 1776-22-0108

PROJECT LOCATION Lily, KY

DATE STARTED 8/22/22

COMPLETED 8/22/22

GROUND ELEVATION \_\_\_\_\_

HOLE SIZE 4-1/4" inches

DRILLING CONTRACTOR Strata Group

GROUND WATER LEVELS:

AT TIME OF DRILLING ---

LOGGED BY Joe Cooke, PE

CHECKED BY Joe Cooke, PE

▼ AT END OF DRILLING 15.00 ft

NOTES Pt. Cloudy, 80's

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								20	40	60	80
								PL	MC	LL	
0								20	40	60	80
		TOPSOIL									
		PREVIOUSLY PLACED FILL: Brownish gray to gray, very rocky (likely gravel, cobbles and some boulders) SHALE and SANDSTONE, slightly moist to moist									
5											
10											
15		Brown into orange brown LEAN CLAY (CL), silty, moist to very moist									
20											
Bottom of borehole at 20.0 feet.											

**CLIENT** London-Laurel County Economic Development Authority

**PROJECT NAME** Lily Industrial Park

**PROJECT NUMBER** 1776-22-0108

**PROJECT LOCATION** Lily, KY

DATE STARTED 8/22/22

**COMPLETED** 8/22/22

**GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 4-1/4" inches

**DRILLING CONTRACTOR** Strata Group

**GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ----

**LOGGED BY** Joe Cooke, PE

**CHECKED BY** Joe Cooke, PE

AT END OF DRILLING ---

**NOTES** Pt. Cloudy, 80's

**AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲
								20 40 60 80
								PL MC LL
								20 40 60 80
☐ FINES CONTENT (%) ☐								20 40 60 80
0		(GC) PREVIOUSLY PLACED FILL: Gray and very rocky to 5 feet deep. Brown with some lean clay, but still rocky to 13 feet deep. Slightly moist to moist.						
5								
10								
15		(CL) Brown LEAN CLAY (CL), silty, very moist						

Refusal at 18.0 feet.  
Bottom of borehole at 18.0 feet.



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# BORING NUMBER B-8

PAGE 1 OF 1

CLIENT London-Laurel County Economic Development Authority

PROJECT NAME Lily Industrial Park

PROJECT NUMBER 1776-22-0108

PROJECT LOCATION Lily, KY

DATE STARTED 8/22/22

COMPLETED 8/22/22

GROUND ELEVATION \_\_\_\_\_

HOLE SIZE 4-1/4" inches

DRILLING CONTRACTOR Strata Group

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING ---

LOGGED BY Joe Cooke, PE

CHECKED BY Joe Cooke, PE

AT END OF DRILLING ---

NOTES Pt. Cloudy, 80's

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								20	40	60	80
								PL	MC	LL	
0								20	40	60	80
		TOPSOIL									
		(CL) Brown LEAN CLAY (CL), silty, with some sand and fine roots, slightly moist to moist	AU B-1	100							
5		(CL) Light brown LEAN CLAY (CL), silty and sandy, moist									
10		Gray weathered SANDSTONE, dry									

Refusal at 10.5 feet.  
Bottom of borehole at 10.5 feet.

## Laboratory Testing Summary Table



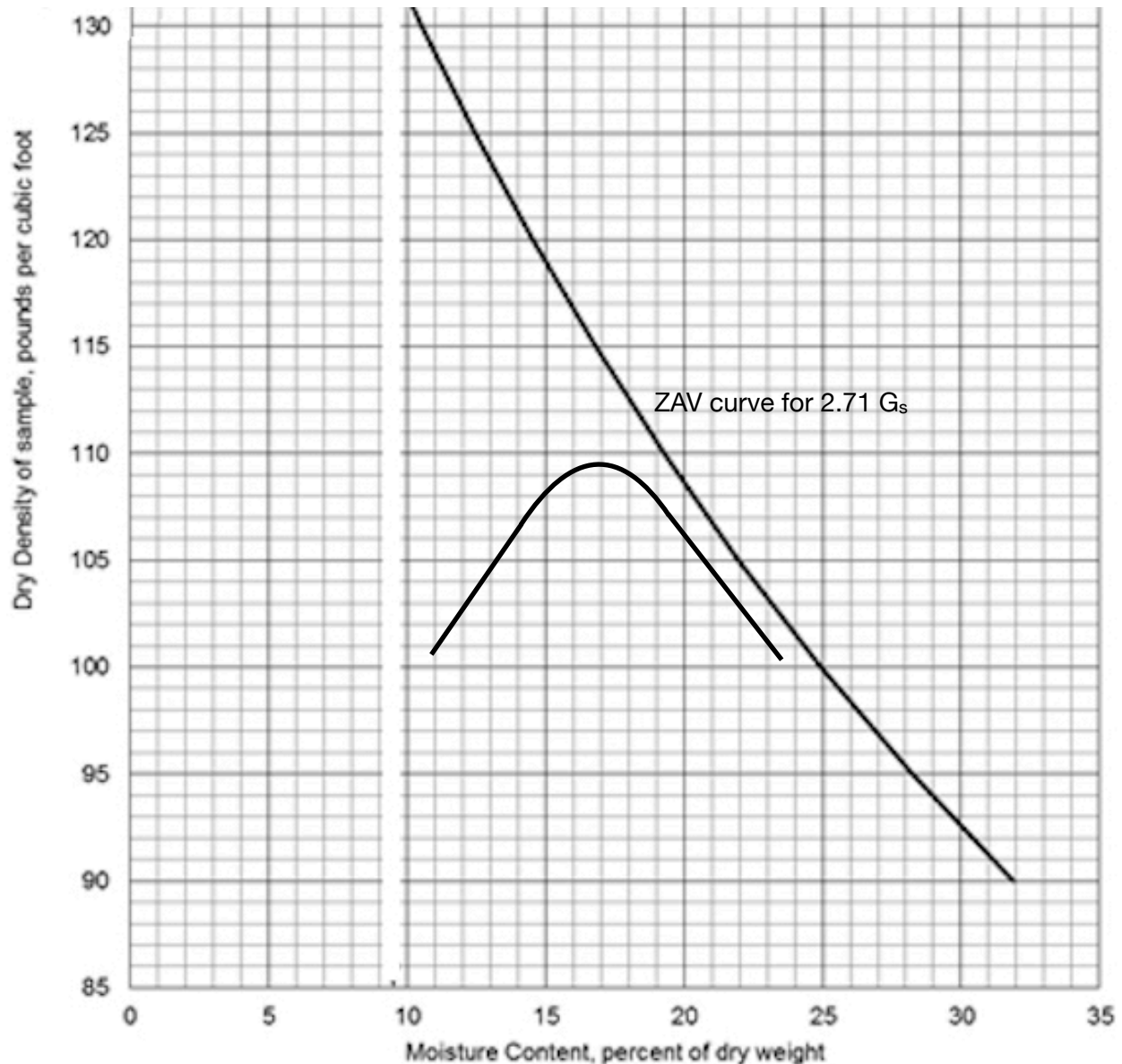
## Moisture-Density ("Proctor") Sheet

Project Name: Lily Industrial Park Date: August 28, 2022

Project Location: Lily, KY Reviewed by: Joe Cooke, PE

Client: London-Laurel County Economic Development Authority  
CETCO Project Number: 1776-22-0108  
"Proctor", ASTM D698-A

Sample ID	Natural Moisture Content (%)	Liquid Limit (%)	Plasticity Index	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	% Finer than #200 Sieve
P-1 (Bulk), 1'-5'	16.8	40	17	109.6	16.9	89.5



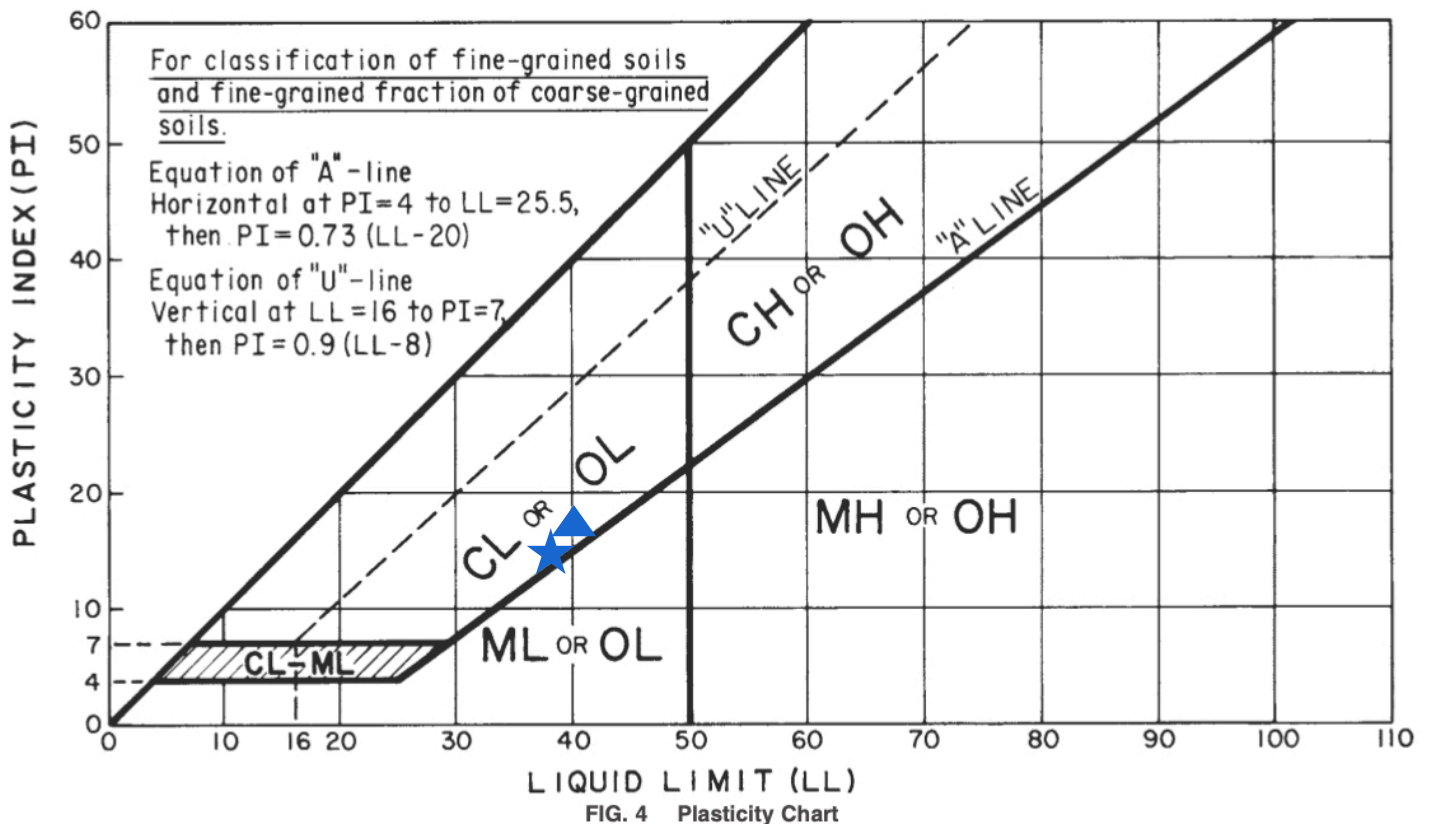
## Atterberg Limits Chart

Project Name: Lily Industrial Park      Date: August 28, 2022

Project Location: Lily, KY      Reviewed by: Joe Cooke, PE

Client: London-Laurel County Economic Development Authority      CETCO Project Number: 1776-22-0108  
"Atterberg Limits", ASTM D4318

Sample ID		Depth (ft)	Natural Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Finer than #200 Sieve
P-1, 1'-5'	▲	1-5	16.8	40	23	17	89.5
B-1, 4.0'-8.5'	★	4-8.5	18.6	38	23	15	62.6





## LABORATORY STANDARDS AND PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests or “by hand” stiffness), color and texture. These classification descriptions are included on our “Boring Logs” or “Test Pit Logs”

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently “wet” to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D4318.

Moisture Content: The Moisture Content is determined according to ASTM D2216.

Percent Finer Than 200 Sieve: Selected samples of soils are washed through a number 200 sieve to determine the percentage of material less than 0.074 mm in diameter.

“Proctor” (Moisture-Density Test): Often called by its original author's name, the “Proctor” test is a moisture-density relationship test to determine “maximum dry density” and “optimum moisture content” curves using a set amount of force of “compaction” at variable moisture contents in a pre-determined mold size. The test is typically ASTM D698, method A, for standard effort. For a “modified” effort (higher amount of force), ASTM D 1557, again method A, is usually used. Due to high amounts of clay as well as typical compaction construction equipment used, the standard Proctor (ASTM D698) is the most common method used. For materials with larger grain sizes, methods B, C and D of each ASTM method can be used.

Rock Strength Tests: To obtain strength data for rock materials encountered, unconfined compression tests are performed on selected samples. In the unconfined compression test, a cylindrical portion of the rock core is subjected to increasing axial load until it fails. The pressure required to produce failure is recorded, corrected for the length to diameter ratio of the core and reported.

## FIELD SERVICES STANDARDS AND PROCEDURES

Field Operations: The general field procedures employed by CETCO are summarized in ASTM D420 which is entitled “Investigating and Sampling Soils and Rocks for Engineering Purposes.” This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical, in situ methods and test pits as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques typically include:

- a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;
- b. Wash borings using roller cone or drag bits (mud or water);
- c. Continuous flight augers (ASTM D 1425).





These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by our field personnel (typically engineers). The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods used during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D1586.

The borings were made by mechanically twisting a hollow stem steel auger into the soil. At regular intervals, the drilling tools were removed and soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Core Drilling: Refusal materials are materials that cannot be penetrated with the soil drilling methods employed. Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Prior to coring, casing is set in the drilled hole through the overburden soils, if necessary, to keep the hole from caving. Refusal materials are then cored according to ASTM D2113 using a diamond-studded bit fastened to the end of a hollow double tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovered is measured, the samples are removed and the core is placed in boxes for storage.

The core samples are returned to our laboratory where the refusal material is identified and the percent core recovery and rock quality designation is determined by a soils engineer or geologist. The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percent. The rock quality designation (RQD) is obtained by summing

## **Field and Lab Procedures**



up the length of core recovered, including only the pieces of core which are four inches or longer, and dividing by the total length drilled. The percent core recovery and RQD are related to soundness and continuity of the refusal material. Refusal material descriptions, recoveries, and RQDs are shown on the "Test Boring Records".

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Rock Classification: Rock classifications (if any) provide a general guide to the engineering properties of various rock types and enable the engineer to apply past experience to current situations. In our explorations, rock core samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The rock cores are classified according to relative hardness and RQD (see Guide to Rock Classification Terminology), color, and texture. These classification descriptions are included on our Boring Records.

Test Pits: Occasionally, our field sampling includes the use of "test pits". Similarly to soil test borings, our classifications on the materials observed and sampled are performed in general accordance with ASTM standards. These excavations are performed by excavators of various sizes and the width/length/depth of the excavations vary as well. Typically, only the soil or "loose" rock areas can be sampled or excavated. The samples taken are usually taken at highly variable depths and the engineer or field personnel have extreme discretion on the sample sizes and locations. These are typically sealed in "zip lock" type baggies and transported back to our office for lab testing and further classification. Visual descriptions of rock materials (sand, gravel, cobbles, boulders, etc.) are provided on both samples taken and observations of spoils removed and sides of excavations. Typically, photos of both the mass excavation and spoil pile are provide on the test pit logs in our reports. Groundwater levels are noted and can include water flow at the excavation bottom or at points of depth in the excavation sides. "Refusal" usually means that the excavator cannot remove additional materials at the excavation bottom. Some excavations may also have very large boulders than cannot be removed by the excavator used. Depths indicated on the logs are usually measured with steel tape or cloth tape. Final complete details of the test pit findings and opinions are provided in the "Test Pit Logs" in our reports. Lastly, test pit excavations have no set standards and are performed at our engineers discretion.

## **SECTION 02100 - EROSION CONTROL**

### **PART 1 - GENERAL**

#### **1.01 Work Included**

Submit KPDES Notice of Intent (NOI) and all follow-up information. Take responsibility for locating, furnishing, installing, and maintaining temporary sediment and erosion control best management practices for earth disturbing activity areas and developing a Best Management Practices (BMP) Plan using good engineering practices as required by the Kentucky Pollutant Discharge Eliminating System (KPDES) Permit. Make and record inspections of BMPs and areas as required by the KPDES Permit. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State or Local agencies, adhere to the more restrictive laws, rules, or regulations. A template for the Contractor's use in preparing the BMP Plan is supplied in these documents.

#### **1.02 Related Work**

- A. Section 02110 - Site Clearing
- B. Section 02200 - Earth and Rock Work
- C. Section 02936 - Seeding

### **PART 2 - PRODUCTS**

Not used

### **PART 3 - EXECUTION**

As the permittee, submit the KPDES Notice of Intent (NOI) form to the Division of Water. Additionally, delegate in writing to Manager, KPDES Branch, who will have signature authority for reports. Provide the Engineer a copy of the NOI and a BMP Plan to represent and warrant compliance with the Kentucky Division of Water (KDOW) KPDES Permit, related rules, and specifications prior to starting work.

Locate, furnish, install, and maintain temporary sediment and erosion control best management practices (BMP) to represent and warrant compliance with the Clean Water Act, (33 USC Section 1251 et seq.), the 404 permit, the 401 Water Quality Certification, local government agency requirements, and other related rules and permits until the project has a formal release issued.

Provide the Engineer a copy of all weekly and rainfall event inspections as they are completed. Ensure all reports are signed by the delegated authority. keep a current BMP Plan and all inspection records available for public inspection as required by the KPDES Permit.

These provisions survive the completion and/or termination of the contract. The following provisions must be followed:

- A. Take full responsibility and make all corrections when a governmental agency or a local governmental authority finds a violation of the above noted requirements; that the BMPs are incomplete; that the BMP Plan is incomplete; or that the implementation of the BMP Plan is not being performed correctly or completely.

- B. Make payment to the Owner for the full amount, within 10 Calendar Days of notification, when a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements; the BMPs being incomplete; or the BMP Plan being incomplete or its implementation not being performed correctly or completely. The Owner may withhold the amount of money requested for the above from the next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.
- C. Indemnify and hold harmless the Department, and reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Owner may withhold the amount of any assessments, damage judgments or finding, fine, penalty or expense from the next pay estimate.
- D. The Owner will find the Contract in default if a governmental agency or a local governmental authority furnishes a stop work order for any of the following: a violation of the above noted requirements, that the BMPs are incomplete, that the BMP Plan is incomplete, that the implementation of the BMP Plan is not being performed correctly or completely.
- E. When the Owner or any government regulatory agency finds a violation of the above noted requirements, or that the BMPs are incomplete, or that the "BMP Plan is incomplete or that the implementation of the BMP Plan is not being performed correctly or completely, correct and mitigate the conditions within 48 hours of notification by the Owner or regulatory agency. Failure to correct non-compliant site conditions will result in the Owner applying a penalty of \$500 per day until corrective actions are completed.

Upon completion of the project, provide the Engineer with a copy of the submitted KPDES Notice of Termination (NOT) form. Retain all records for 2 years.

- F. Maintenance of all BMPs at the site will be handled by a Contractor's employee or sub-contractor, who has been trained on construction site BMPs at workshops sponsored by the KY DOW and the Kentucky Erosion Protection and Sediment Control (KEPSC) Program. Other workers on-site will be trained in BMP installation, maintenance, and good housekeeping by this employee or sub-contractor.

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- Areas at final grade will be seeded and mulched within 14 days.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported. This information will be logged on the SWPPP/BMP Plan.

- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts. Bypasses will be repaired immediately.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- The inlet sediment protection devices will be inspected for depth of sediment, and built-up sediment will be removed when it impairs flow into the inlet and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.

G. Inspection Procedures (Stormwater, Erosion, and Sediment Control Inspection Practices). Inspection of all BMPs at the site will be handled by the Contractor's qualified employee or sub-contractor, who has been trained on inspecting construction site BMPs at workshops sponsored by the KY DOW and the Kentucky Erosion Protection and Sediment Control (KEPSC) Program.

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- The Contractor's erosion control inspector will train three other people who will be responsible for assisting in the inspections and installing, maintaining, and repairing the controls on the site.
- Inspection reports will be written, signed, dated, and kept on file for two years.

END OF SECTION

## **SECTION 02110 - SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.01 Work Included**

- A. Furnish all labor and equipment required and perform all clearing, grubbing and stripping of topsoil complete as shown on the Drawings and as specified herein.
- B. Protect existing improvements and vegetation indicated to remain.

#### **1.02 Related Work**

- A. Section 02200 - Earth and Rock Work.

### **PART 2 - PRODUCTS**

Not used.

### **PART 3 - EXECUTION**

#### **3.01 Protection**

- A. Protect existing improvements, bench marks, monuments and other reference points.
- B. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning of bark, piling construction materials or excavated materials within drip line, excess traffic or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to remain.

#### **3.02 Site Clearing**

- A. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions, interfering with installation of new construction. All stumps, roots, and root clusters shall be grubbed out to a depth of at least two feet below subgrade elevation.
- B. Strip topsoil to whatever depths encountered in a manner to prevent mixing with subsoil or other material. Stockpile topsoil for re-use as a final cover where seeding is required.

#### **3.03 Removal**

- A. All trees and vegetation shall be burned, if possible, or removed from the site. The contractor shall obtain any necessary local or state permits for burning and shall comply with all applicable laws or restrictions for burning. Unsuitable excavated soil or topsoil, or other unsuitable materials shall be removed from the site by the Contractor unless specific arrangements are made with the Owner for disposal on site. Contractor shall make arrangements for off-site disposal of unsuitable materials.

End of Section

## **SECTION 02200 - EARTH AND ROCK WORK**

### **PART 1 - GENERAL**

#### **1.01 Work Included**

- A. This section includes all labor, materials, equipment, and related items to complete all earth and rock work.
- B. The extent of earth and rock work is shown on drawings. The following work is included:
  - 1. Strip top soil and vegetation from the work area.
  - 2. Perform earthwork to achieve the required grades.
  - 3. Establish and maintain horizontal and vertical ground control throughout the work.
  - 4. Locate and clearly mark all utilities on or adjacent to the site.

#### **1.02 Related Work Specified Elsewhere**

- A. Section 02100 - Erosion Control
- B. Section 02110 - Site Clearing
- C. Section 02936 - Seeding

#### **1.03 Excavation Classification**

- A. All mass, structural, and trench excavation shall be considered unclassified. No adjustments will be allowed to the contract price for rock encountered during mass or structural excavation.

#### **1.04 Quality Assurance**

- A. Codes and Standards: Perform earth and rock work in compliance with applicable requirements of governing authorities having jurisdiction. Applicable references include the following:

ASTM D422 Particle Size Analysis of Soils.

ASTM D423 Test for Liquid Limit of Soils.

ASTM D424 Test for Plastic Limit and Plasticity Index of Soils.

ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort

ASTM D3017 Moisture content of Soil Aggregates in Place by Nuclear Methods (Shallow Depth).

- B. Testing and Inspection Service: A testing laboratory will be employed to perform soil testing and inspection services for quality control testing during earth and rock work operations. Testing laboratory employed is to observe, test and report to the Engineer that the compaction requirements specified herein have been obtained.

## 1.05 Submittals

- A. Test Reports-Excavating: Coordinate and schedule in a timely manner the following quality related items. The following reports shall be submitted directly to the Engineer from the testing services, with copy to the Contractor:
- Test reports on borrow material.
  - Field density test reports of sufficient number to verify compaction of structural fill.
  - One optimum moisture-density curve for each type of soil encountered. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.
  - Observe proof-rolling.

## 1.06 Job Conditions

- A. Site Information. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all condition that may be encountered. No claim for extra compensation, or for extension of time, will be allowed on account of subsurface conditions inconsistent with the data shown. Additional test borings and other site examination and exploratory operations may be made by Contractor at no cost to Owner. Notify Owner prior to making any subsurface exploration.
- B. Groundwater. Groundwater may be encountered during the excavation. Control the ground water to a level at least three feet below the top of the subgrade.
- C. Explosives. Blasting shall only be conducted by licensed blasters and shall be in accordance with state and local requirements, and after conducting a thorough pre-blast survey.
- D. Protection of Persons and Property. Barricade open excavations occurring as part of this work and post with warning lights.
- E. Bench Marks and Monuments. Maintain carefully all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed at no cost to the owner.
- F. Notify the Engineer 48 hours prior to the beginning of any excavation work.

## **PART 2 - PRODUCTS**

### 2.01 Materials

- A. Satisfactory soil. Satisfactory soils are materials complying with Unified Soil Classification System (USCS), ASTM D 2487-93, soil classification group SP, SM, SC, ML, MH and CL.



## PART 3 - EXECUTION

### 3.01 Excavation

- A. Excavation consists of removal and disposal of material encountered when establishing required finish grade elevations. For the purpose of this contract, mass, structural and trench excavation of all materials shall be considered unclassified. Adjustments for rock or similar materials will not be considered.
- B. Unauthorized excavation. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.

Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

Backfill and compact unauthorized excavations, as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

- C. Additional Excavation. When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions.

If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Engineer.

Removal of unsuitable bearing material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

- D. Stability of Excavations. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restriction or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- E. Shoring and Bracing. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

Maintain shoring and bracing in excavations, regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

- F. Dewatering. Prevent surface water and subsurface or ground water from flowing into excavations and flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of excavation bottoms and soil changes detrimental to stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches. Site grading should be maintained during construction so that positive drainage of the site is promoted at all times.

- G. Material Storage. Stockpile satisfactory excavated materials, where directed by Engineer, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

Dispose of excess soil material and waste materials as herein specified.

- H. Cold Weather Protection. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).
- I. Proofrolling. After excavation and before any fill placement, entire subgrade shall be proof-rolled with a loaded pneumatic tired vehicle, such as a dual axle dump truck with a gross weight of 16 to 20 tons, or similar equipment. Remove any soft, organic, or highly plastic soil encountered during proof-rolling and replace it with properly compacted fill.

### 3.02 Compaction

- A. General. Control soil compaction during construction, providing minimum percentage of density specified for each area classification.
- B. Lift Thickness. Soil used for structural fill construction should be placed in layers no greater than 10 inches in loose placement for heavy equipment placement, or 5 inches for hand operated whacker or vibratory plate placement.
- C. Percentage of Maximum Density Requirements. Compact soil as required by the Geotechnical Report to the required percentage of the maximum dry density.
- D. Moisture Control. Maintain soil moisture to required range of optimum moisture content. Where soil must be moisture conditioned before compaction, uniformly apply water to prevent free water from appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

### 3.03 Backfill and Fill

- A. General. Place acceptable soil material in layers to required subgrade elevations.
- B. Backfill excavations as promptly as work permits, but not until acceptance of construction below finish grade and removal of trash and debris.

- C. Ground Surface Preparation. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
- D. Placement and Compaction. Place backfill and fill materials in layers to provide lift thickness.

### 3.04 Grading

Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

### 3.05 Field Quality Control

- A. Quality Control Testing During Construction. Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. It shall be the Contractor's responsibility to notify the testing agency at least 24 hours prior to beginning any work which requires testing.
- B. If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

### 3.06 Maintenance

- A. Protection of Graded Areas. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas. Where completed compacted areas are disturbed by subsequent construction operations or weather, scarify surface, reshape and compact to required density prior to further construction.
- C. Settling. Where settling is measurable or observable at excavated areas during general project warranty period, add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.
- D. Desiccation. Where desiccation cracks are observable, remove and replace soil to restore appearance, quality and condition of surface.

### 3.07 Disposal of Excess and Waste Materials

Stockpile excess excavated material at a location near the site designated by the Engineer.

End of Section

## **SECTION 02720 - STORM DRAINAGE SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 Work Included**

- A. Storm drainage pipe fittings, and accessories.
- B. Storm water structures

#### **1.02 Submittals**

- A. Submit product data under provisions of Section 01300.

### **PART 2 - PRODUCTS**

#### **2.01 Reinforced Concrete Pipe**

- A. Reinforced concrete pipe shall meet requirements of ANSI/ASTM C76, Class I with Wall Type A; B; C; mesh reinforcement; inside nominal diameter as required; bell and spigot end joints.
- B. Joint device shall meet requirements of ANSI/ASTM C443, rubber compression gasket joint.
- C. Fittings shall be of the same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.

#### **2.21 HDPE Pipe**

HDPE pipe shall meet the following requirements:

- ASTM D1248 Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
- ASTM F405 Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings
- ASTM F667 Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

#### **2.22 POLYVINYL CHLORIDE (PVC) PIPE (SOLID WALL)**

- A. PVC pipe and fittings less than 15 inches in diameter shall conform to the requirements of ASTM Standard Specifications for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings, Designation D 3034. Pipe and fittings shall have a minimum cell classification of 12454B or 12454C as defined in ASTM D-1784. For depths 10 feet and less, pipe shall have a pipe diameter to wall thickness ratio (SDR) of 35. For depths greater than 10 feet up to 20 feet maximum, pipe shall be SDR 26. If the PVC pipe is encased in a steel pipe, PVC pipe shall be SDR 35 regardless of buried depth.

- B. PVC pipe and fitting with diameters 18-inch through 48-inch shall conform to the requirements of ASTM D-17845 and ASTM F-679. Pipe and fittings shall have a minimum cell classification of 14545C. The minimum wall thickness shall conform to T-1 as specified in ASTM F-679. For depths 10 feet and less, pipe shall have pipe stiffness 46 (SDR 35). For depths greater than 10 feet up to 20 feet maximum, pipe shall have pipe stiffness of 115 (SDR 26). If the PVC pipe is encased in a steel pipe, PVC pipe shall be SDR 35 regardless of buried depth.
- C. Joints shall be push-on bell and spigot type using elastomeric ring gaskets conforming to ASTM D 3212 and F 477. The gaskets shall be securely fixed into place in the bells so that they cannot be dislodged during joint assembly. The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.
- D. Pipe shall be furnished in lengths of not more than 13 feet. The centerline of each pipe section shall not deviate from a straight line drawn between the centers of the openings at the ends by more than 1/16 inch per foot of length.
- E. PVC pipe shall not have a filler content greater than ten percent (10%) by weight relative to PVC resin in the compound.
- F. PVC pipe shall be clearly marked at intervals of 5 feet or less with the manufacturer's name or trademark, nominal pipe size, PVC cell classification, the legend "Type PSM SDR 35 PVC Sewer Pipe" and the designation "ASTM D 3034", or "ASTM F-679". Fittings shall be clearly marked with the manufacturer's name or trademark, nominal size, the material designation "PVC", "PSM" and the designation "ASTM D 3034", or "ASTM F-679".
- G. PVC pipe shall have minimum pipe stiffness of 46 psi (SDR 35) or 115 psi (SDR 26) for each diameter when measured at 5 percent vertical ring deflection and tested in accordance with ASTM D 2412.
- H. PVC pipe installation shall conform to ASTM D-2321 latest revision.
- I. Pipe shall be as manufactured by JM Eagle, H & W Pipe Company, or equal.

## 2.03 Concrete Storm Water Structures

Concrete Storm water structures shall meet the following requirements, as applicable:

- ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete
- ACI 318 - Building Code Requirements for Reinforced Concrete
- ASTM C478 - Specification for Precast Reinforced Concrete Manholes Sections

- ASTM 1433 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- ASTM C1478 - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
- ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealant
- CRSI Manual of Standard Practice

### 2.3.1 PVC Storm Water Structures

Plastic Storm Drainage Structures shall be Nyloplast PVC structures with H-20 traffic rating, with water-tight gasketed push-on joints, ductile iron ASTM A536 grade (70-50-05) grates (locking type), ADA compliant or pedestrian rated where required.

## **PART 3 - EXECUTION**

### 3.01 Pipe Installation

- Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings.
- Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.
- Lay pipe to slope gradients noted on drawings, with maximum variation from true slope of 1/8 inch in 10 feet.

### 3.02 Storm Water Structure Installation

- Precast concrete products shall be installed to the lines and grades shown in the contract documents or otherwise specified.
- Products shall be lifted by suitable lifting devices at points provided by the precast concrete producer.
- Products shall be installed per the precast concrete producer's recommendation.

End of Section

## **SECTION 02936 - SEEDING**

### **PART 1 - GENERAL**

#### **1.01 Work Included**

The work described herein shall consist of application of seed, fertilizer and agricultural limestone to establish turf.

### **PART 2 - PRODUCTS**

#### **2.01 Seed**

Seed shall be of the following mixture:

<u>Seed Type</u>	<u>Percentage</u>
Fine Lawn Fescue	60%
Bluegrass	25%
Perennial Rye	15%

Seed shall be applied uniformly at the rate of three pounds per 1,000 square feet.

#### **2.02 Agricultural Limestone**

Agricultural limestone shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve. Agricultural ground limestone shall be from quarries approved by the Kentucky Department of Agriculture.

Agricultural limestone shall be applied uniformly at the rate of 100 pounds per 1,000 square feet.

#### **2.03 Fertilizer**

Fertilizer shall be commercial grade, free flowing, uniform in composition.

Fertilizer shall be 10-20-20 applied uniformly at the rate of 25 pounds per 1,000 square feet.

#### **2.04 Mulch**

Mulch shall be clean straw and shall be applied at a rate of 100 pounds per 1,000 square feet.

## **PART 3 - EXECUTION**

### **3.01 Delivery, Storage and Handling**

Fertilizer and limestone shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to State and Federal laws. In lieu of containers, fertilizer and limestone may be furnished in bulk and a certificate indicating the above information shall accompany each delivery.

Seed, limestone and fertilizer shall be kept in dry storage away from contaminants, insects and rodents.

### **3.02 Seeding**

Seed shall be broadcast uniformly. The seed shall be covered to an average depth of 1/4 inch by means of spike-tooth harrow, cultipacker, no till drill or other approved device. Seed shall not be broadcast when winds are above 10 mph. Immediately after seeding, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width and the soil moistened to a depth of 6-8 inches. If seeding is performed with a cultipacker-type seeder or if seed is applied in combination with hydromulching, rolling will not be required.

### **3.03 Maintenance**

Seeded areas shall be protected and maintained by watering and replanting as may be necessary to produce a uniform stand of grass. Maintenance shall continue until a dense, uniform turf is established composed of the grasses specified and until acceptance, and shall include repair of damage caused by erosion.

End of Section



## **SECTION 03110 - CONCRETE FORMWORK**

### **PART 1 - GENERAL**

- A. The general provisions of the Contract, including General Conditions and Requirements, apply to the work specified in this section.

### **PART 2 - DESCRIPTION OF WORK**

- A. The extent of formwork is indicated by the concrete structures shown on the drawings.
- B. The work includes providing formwork and shoring for cast-in-place concrete, and installation into formwork of items furnished by others, such as anchor bolts, setting plates, bearing plates, anchorages, inserts, frames, nosings and other items to be embedded in concrete (but not including reinforcing steel).

### **PART 3 - QUALITY ASSURANCE**

- A. The Installer must examine the substrate and the conditions under which concrete formwork is to be performed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

### **PART 4 - CODES AND STANDARDS**

- A. Unless otherwise shown or specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347, "Recommended Practice for Concrete Formwork".
- B. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347, and as follows:
  - 1. Variation from plumb in lines and surfaces of walls, and arises; 1/4" per 10 ft., but not more than 1". For exposed control joint grooves, and other conspicuous lines, 1/4" in any bay or 20 ft. max; 1/2" max. in 40 ft. or more.
  - 2. Variation from level or grade in slab, walls and in arises 1/8" in 10 ft., 3/8" in any bay or 20 ft. max., and 3/4" in 40 ft. or more. For exposed horizontal grooves and other conspicuous lines, 1/4" in any bay or 20 ft. max. and 1/2" in 40 ft. or more.
  - 3. Variation from position of the linear building lines and related walls, and partitions, 1/2" in any bay or 20 ft. max., and 1" in 40 ft. or more.
  - 4. Variation in cross-sectional dimensions of thickness of slabs and walls, minus 1/4" and plus 1/2".

5. Variations in footings plan dimensions, minus 1/2" and plus 2"; misplacement or eccentricity, 2% of the footing width in direction of misplacement but not more than 2"; thickness reduction minus 2%.
  6. Variation in steps; in a flight of stairs, 1/8" for rise and 1/4" for treads; in consecutive steps, 1/16" for rise and 1/8" for treads.
- C. Before concrete placement check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
  - D. During concrete placement check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.

## **PART 5 - SUBMITTALS**

- A. For information only, submit 2 copies of manufacturer's data and installation instructions for proprietary materials including form coatings, manufactured form systems, ties and accessories.
- B. Submit shop drawings for fabrication and erection of specific finished concrete surfaces as shown or specified.
- C. Architects review will be for general architectural applications and features only. Design of formwork for structural stability and sufficiency is the Contractor's responsibility.

## **PART 6 - FORM MATERIALS**

- A. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to Architect, to provide continuous, straight, smooth as-cast surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
  1. Use plywood complying with U.S. Product Standards PS-1, "B-B (Concrete Form) Plywood" Class 1, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing the legible trademark of an approved inspection agency.
- B. Form concrete surfaces which will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and 1 side for tight fit.
- C. Provide factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

- D. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1½" from the outer concrete surface. Unless otherwise shown, provide form ties which will not leave a hole larger than 1" diameter in the concrete surface.
- E. Form ties fabricated on the project site and wire ties are not acceptable.
- F. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.
- G. Provide metal inserts for anchorage of materials or equipment to concrete construction, not supplied by other trades and as required for the work.

## **PART 7 - DESIGN OF FORMWORK**

- A. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
- C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
- D. Support form facing materials by structural members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.
- E. Provide temporary openings in wall forms, and at other locations necessary to permit inspection and clean-out.
- F. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- G. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
- H. Side forms of footings may be omitted and concrete placed directly against excavation

only when requested by Contractor and accepted by Architect. When omission of forms is accepted, provide additional concrete required beyond the minimum design profiles and dimensions of the footings as detailed, at no cost to the Owner.

## **PART 8 - FORM CONSTRUCTION**

- A. General: Construct forms complying with ACI 347, to the exact sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screens, bulkheads, anchorages and inserts, and other features required. Use selected material to obtain required finishes.
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
- C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in as inconspicuous location as possible, consistent with project requirements.
- D. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.
- E. Provide openings in forms to accommodate other work, including mechanical and electrical work. Accurately place and securely support items required to be built into the forms.

## **PART 9 - FORMS FOR EXPOSED CONCRETE**

- A. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
- B. Do not use metal cover plates for patching holes or defects in forms.
- C. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
- D. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
- E. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
- F. Form molding shapes, recesses and projections with smooth-finish materials, and install

in forms with sealed joints to prevent displacement.

G. Form chamfers with 3/4" x 3/4" strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.

H. Unexposed corners may be formed either square or chamfered.

## **PART 10 - CONTROL JOINTS**

A. See 3A section for treatment of control and construction joints, including wood screeds, metal keyways and sawcuts. Locate as indicated.

## **PART 11 - PROVISION FOR OTHER TRADES**

A. Provide openings in concrete formwork to accommodate work of other trades, including those under separate prime contracts (if any). Size and location of openings, recesses and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into forms.

## **PART 12 - CLEANING AND TIGHTENING**

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

## **PART 13 - FORM COATINGS**

A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.

B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

## **PART 14 - REMOVAL OF FORMS**

A. General: Formwork not supporting concrete, such as sides of walls, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F for 24-hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided that curing and protection operations are maintained.

## **PART 15 - RE-USE OF FORMS**

A. Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

## **PART 16 - CAST-IN-PLACE CONCRETE WALLS**

- A. Forms for concrete work shall be so constructed as to produce finished concrete of precise sizes, shapes, lines, and locations shown on drawings, as approved by the Architect.
- B. Forms shall be substantially built with sufficient strength and rigidity to support dead-weight of wet concrete, impact at pouring, force of vibration of concrete without spreading or buckling, accurately put together with tight joints to prevent leakage of cement and water.
- C. Forms shall be clean, free of papers, sawdust, dirt debris. Temporary clean-out panels shall be provided in column, interior side of wall forms and at other points where necessary to facilitate cleaning and inspection immediately before depositing concrete. Dust or debris will not be tolerated in forms when concrete is to be placed. Joints in forms for cleanout panels shall be located away from finished surfaces wherever possible. Such joints shall be neat, tight, and leave only marks of type which can be removed by light grinding finished concrete. Provide cover of polyethylene sheeting for column and wall forms to prevent accumulation of dirt, debris, etc., in forms.
- D. Form ties for finished walls, if used, must be lined up, uniformly spaced in each panel in both horizontal and vertical directions. Form tie patching shall be approved by the Architect for profile and finish. Where openings occur at right regular spacings do not use wall ties above, below or between openings. Use wall ties only through openings. Provide walers, bracing beams above, below, between openings as required to contain freshly placed concrete.
  - 1. This Contractor shall construct forms for openings, slots, beam pockets, light recesses, notches or chases required in concrete members for installation by other trades as directed by subcontractor requiring same.

End of Section

## **SECTION 03210 - CONCRETE REINFORCEMENT**

### **PART 1 - GENERAL**

- A. The general provisions of the Contract, including General Conditions and Requirements, apply to the work specified in this section.
- B. Codes and Standards: Comply with requirements of the following codes and standards, except as herein modified:
- C. Also, the work includes reinforcement for independent foundations and retaining walls.

### **PART 2 - QUALITY ASSURANCE**

- A. The Installer must examine the substrate and the conditions under which concrete reinforcement is to be placed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Codes and Standards: Comply with requirements of the following codes and standards, except as herein modified:
  - 1. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
  - 2. American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete".
- C. For information only, submit 2 copies of steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.
- D. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315, "Manual of Standard Practice for Detailing Reinforced concrete Structures". Show Bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement.
- E. Deliver reinforcement to the project site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

### **PART 3 - MATERIALS**

- A. Reinforcing Bars (ReBar): ASTM A 615, ASTM A 616 or ASTM 617, as follows:
  - 1. Provide Grade 60 for Bars No. 2 to 11
- B. Steel Wire: ASTM A 82
- C. Welded Wire Fabric (WWF): ASTM A 185
- D. Supports for Reinforcements: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
  - 1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
- E. Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane.

### **PART 4 - FABRICATION**

- A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice". In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:
  - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
  - 2. Bend or kinks not indicated on drawings or final shop drawings.
  - 3. Bars with reduced cross-section due to excessive rusting or other cause.

### **PART 5 - INSTALLATION**

- A. Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials



which reduce or destroy bond with concrete.

- C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
- D. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16 gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.
- F. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- G. Splices: Provide standard reinforcement splices by lapping ends, placing bars on contact, and tightly wire tying. Comply with requirements of ACI 318 for minimum lap of spliced bars.
- H. Welded wire fabric must have end laps of one full mesh plus two (2) inches between cross wires and edge laps. Welded wire fabric should extend into supporting beams and walls for anchorage unless an expansion joint is called for on the drawings.
- I. Provide dowels in walls at all construction joints and in wall footings, equivalent in size and number to vertical steel extending 30 bar diameters into footing and 30 bar diameters into wall. Lap vertical wall and column rebars 30 bar diameters unless otherwise shown.
- J. Reinforcing steel bends to be made as per diagram, and/or in accordance with the ACI Code.

End of Section

## **SECTION 03310 - CAST-IN-PLACE CONCRETE**

### **PART 1 - GENERAL**

- A. The general provisions of the Contract, including General Conditions and Requirements, apply to the work of this section.

### **PART 2 - DESCRIPTION OF WORK**

- A. Work includes furnishing, forming and placing of all concrete work as shown on the drawings, and specified herein, including the following:
  - 1. All anchor bolts required for anchoring steel columns to concrete installed only.
  - 2. All inserts, anchors, etc., that must be placed in forms for later attachment of work of other trades, except Mechanical-Electrical.
  - 3. Building-in of inserts, anchors, sleeves, etc., as furnished by the Mechanical-Electrical Contractors and Structural Steel Supplier.
  - 4. Expansion Joint Filler.
  - 5. Joint Filler and sealer at edge of slabs.
  - 6. Waterstops.
  - 7. Crushed stone fill under slabs on grade.
  - 8. Vapor barrier under slabs on grade.
    - a. 6 mil. polyethylene
    - b. Vapor Seal 1/8" Heavy Duty
  - 9. Curing Compound, Sealer and Hardener.
- B. The extent of cast-in-place concrete (CIP-Conc) work is shown on the drawings.
- C. The work includes providing cast-in-place concrete (CIP-Conc) consisting of portland cement, fine and coarse aggregate, water, and selected admixtures; combined, mixed, transported, placed, finished and cured as herein specified.

### **PART 3 - RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete Formwork: Section 03110.
- B. Concrete Reinforcement: Section 03210.

### **PART 4 - CODES AND STANDARD**

- A. Comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified.
  - 1. ACI 301 "Specifications for Structural Concrete for Buildings".
  - 2. ACI 318 "Building Code Requirements for Reinforced Concrete".
  - 3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
  - 4. ACI 311 "Recommended Practice for Concrete Inspection".
- B. Where provisions of the above codes and standards are in conflict with building code in force for this project, the building code shall govern.

- C. The Contractor shall employ, at his own expense, a testing laboratory experienced in design of concrete materials and mixes to design concrete mixes.
  - 1. Testing of concrete materials will be paid out of the testing allowance.
- D. Selection of a testing laboratory is subject to the Architect's acceptance.
- E. The testing laboratory shall perform field quality control testing. The Contractor shall provide free access and facilities at any time during the progress of the work.
- F. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

## **PART 5 - TESTS FOR CONCRETE MATERIALS**

- A. For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C33.
- B. For portland cement, sample the cement and determine the properties by the methods of test of ASTM C150.
- C. Submit written reports to the Architect for each material sampled and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

## **PART 6 - SUBMITTALS**

- A. For information only, submit 2 copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.
- B. Submit samples of materials as specified and as otherwise may be requested by the Architect, including names, sources and descriptions as required.
- C. Submit 2 copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.
- D. Provide materials certificates in lieu of materials laboratory test reports only when permitted by the Architect. Material certificates shall be signed by the material manufacturer and the Contractor, certifying that each material item complies with, or exceeds, the specified requirements.
- E. Delivery Tickets: Furnish copies of delivery tickets for each load of concrete delivered to the site. Provide items of information as specified.

## PART 7 - CONCRETE

- A. All concrete shall conform and be designed, mixed, placed, tested and cured in accordance with the ultimate strength provisions of the American Concrete Institute Building Code. All concrete shall develop the following compressive strength in 28 days.

Compressive Strength Concrete Schedule

	Minimum 28-Day Compr. Str.	Minimum Cement (per cu.yd.)	Max-Min Slump (inch)	Air Content (%)
All concrete not otherwise indicated	3,500	5-1/2 sacks	4-1	2%-4%
Exterior plaza slabs	4,000	6 sacks	3-1	4%-7%

## PART 8 - CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, as follows:
1. Provide Type 1 cement, except as otherwise indicated. Type 3 cement may be used in lieu of Type 1 at Contractor's option, when acceptable to the Architect.
  2. Provide Type 3 cement for High-Early Strength concrete for exterior concrete when acceptable to the Architect.
- B. Use only one brand of cement for each required type throughout the project, unless otherwise accepted by the Architect.
- C. Aggregates: ASTM C 33, and as herein specified.
1. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.
  2. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite or ochre which can cause stains on exposed concrete surfaces.
  3. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
  4. Dune sand, bank run sand and manufactures sand are not acceptable.
  5. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter.
  6. Crushed stone, processed from natural rock or stone.
  7. Washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.

8. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.
- D. Supply of Aggregates: Provide aggregates from one source of supply to ensure uniformity in color, size and shape.
- E. Water: Clean, fresh, drinkable.
- F. Provide admixtures produced by established reputable manufacturers and use in compliance with the manufacturer's printed directions. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by the Architect.
1. Air-Entraining Admixtures: ASTM C 260.
  2. Water-Reducing Admixture: ASTM C 494, Type A.
- G. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by the Architect. Do not use admixtures containing calcium chloride where concrete is placed against galvanized steel, or in mix using high-early strength cement.

## **PART 9 - PROPORTIONING AND DESIGN OF MIXES**

- A. Prepare design mixes for each type of concrete. Use an independent testing facility acceptable to the Architect for preparing and reporting proposed mix designs.
- B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each class of concrete required, complying with ACI 211.1 and report to the Architect the following data:
1. Complete identification of aggregate source of supply.
  2. Tests of aggregates for compliance with specified requirements.
  3. Scale weight of each aggregate.
  4. Absorbed water in each aggregate.
  5. Brand, type and composition of cement.
  6. Brand, type and amount of each admixture.
  7. Amounts of water used in trial mixes.
  8. Proportions of each material per cu. yd.
  9. Gross weight and yield per cu. yd of trial mixtures.
  10. Measured slump.
  11. Measured air content.
  12. Compressive strength developed at least 7 days and 28 days, from not less than 3 test cylinders cast for each 7 and 28-day test, and for each design mix.
- C. Submit written reports to the Architect of each proposed mix for each type of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Architect.
- D. Laboratory Trial Batches: When laboratory trial batches are used to select concrete proportions, prepare test specimens in accordance with ASTM C 192 and conduct strength tests in accordance with ASTM C 39, as specified in ACI 301.

- E. Establish a curve showing relationship between water-cement ratio (or cement content) and compressive strength, with at least 3 points representing batches which produce strengths above and below that required. Use not less than 3 specimens tested at 28-days, or an earlier age when acceptable to the Architect, to establish each point on the curve.
- F. Field Experience Method: When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301.
- G. Strength data for establishing standard deviation will be considered suitable if the concrete production facility has certified records consisting of at least 30 consecutive tests in one group or the statistical average for 2 groups totaling 30 or more tests, representing similar materials and project conditions.
1. Standard Deviation: If standard deviation exceeds 600 psi or if no suitable records available, select proportions to produce an average strength of at least 1200 psi greater than the required compressive strength concrete.
  2. After sufficient experience and test data become available from the job, using ACI 214 methods of evaluation, the standard deviation may be reduced when the probable frequency of tests more than 500 psi below required compressive strength will not exceed 1 in 100, and that the probable frequency of an average of 3 consecutive tests below required compressive strength will not exceed 1 in 100.
- H. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by the Architect before using in the work.
- I. Use air-entraining admixture in exterior exposed concrete, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:
1. Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:
    - a. 4% for maximum 2" aggregate.
    - b. 6% for maximum 3/4" aggregate.
    - c. 7% for maximum 1/2" aggregate.
  2. Other Exterior Concrete: 2% to 4% air.
- J. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control
- K. Proportion and design mixes to result in concrete slump at the point of placement as follows:
1. Ramps and Sloping Surfaces: Not more than 3".
  2. Reinforced Foundation Systems: Not less than 1" and not more than 3".

3. All Other Concrete: Not less than 1" and not more than 3".

## **PART 10 - CONCRETE MIXING**

- A. Concrete may be mixed at batch plants or it may be transit-mixes as specified herein. Batch plants must comply with the requirements of ACI 304, with sufficient capacity to produce concrete of the qualities specified in quantities required to meet the construction schedule. All plant facilities are subject to testing laboratory inspection and acceptance of the Architect.
- B. Comply with the requirements of ASTM C 94, and as herein specified, provided the quantity and rate of delivery will permit unrestricted progress of the work in accordance with the placement schedule. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required, as specified below. Proposed changes in mixing procedures, other than herein specified, must be accepted by the Architect before implementation.
1. Plant equipment and facilities: Conform to National Ready-Mix Concrete Association "Check List for Certification of Ready-Mixed Concrete Production Facilities.
- C. Modifications to ASTM C 94 are as follows:
1. Quality of Concrete: Provide concrete materials, proportions, and properties as herein specified, in lieu of ASTM Section 4.
2. Tolerances in Slump: Provide slump of not more than the values as herein specified, in lieu of ASTM Section 5.1. Comply with other criteria of ASTM Section 5.
3. Mixing and Delivery: Delete the references for allowing additional water to be added to the batch for material with insufficient slump. Addition of water to the batch will not be permitted as specified in ASTM Section 9.7, when the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time to 60 minutes. When a truck mixer is used for the complete mixing of the concrete, begin the mixing operation within 30 minutes after the cement has been intermingled with the aggregates.
4. Certification: Furnish duplicate delivery tickets with each load of concrete delivered to the site, one for the Architect and one for the Contractor. In addition to the requirements of ASTM Section 14.1, provide the following information on delivery tickets:
- a. Type and brand of cement.
  - b. Cement content per cu. yd. of concrete.
  - c. Maximum size of aggregate.
  - d. Amount and brand name of each admixture.
  - e. Total water content expressed as water/cement ratio.
5. Strength: Delete ASTM Section 15; comply with concrete testing requirements as herein specified.
- D. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery in order to prevent delay of placing the concrete after mixing, or holding dry-mixed materials too long in the mixer before the addition

of water and admixtures.

## **PART 11 - FIELD QUALITY CONTROL**

- A. Perform sampling and testing for field quality control during the placement of concrete, as follows:
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
  2. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
  3. Air Content: ASTM C 231, pressure method; one for every other concrete load at point of discharge, or when the indicating of change requires.
  4. Compression Test Specimens: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed.
    - a. Cast and store cylinders for laboratory cured test specimens and field-cured test specimens as specified in ASTM C 31.
  5. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, and when 80 degrees F. and above and each time a set of compression test specimens made.
  6. Compressive Strength Tests: ASTM C 39; one set for each 25 cu. yds. or fraction thereof, of each mix design placed in any one day ; 1 specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
    - a. When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
    - b. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- B. Report test results in writing to the Architect, Contractor, and Ready-Mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identifications name and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- C. The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression tests on cored cylinders complying with ASTM C 42, or by load testing specified in ACI 381, or other acceptable non-destructive testing methods, as directed. The



Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

- D. Do not use concrete delivered to the final point of placement which has slump or total air content outside the specified values.
- E. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of three consecutive compressive strength test results equal or exceed the 28-day design compressive strength of the type or class of concrete; and, no individual strength test falls below the required compressive strength by more than 500 psi.
- F. Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protection of the concrete places. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.
- G. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders.
- H. When laboratory-cured cylinder strengths are appreciably higher than the minimum compressive strength, field-cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85% criterion is not met.
- I. If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.
- J. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to additional testing as herein specified.

## **PART 12 - FORMED CONCRETE DIMENSIONAL TOLERANCES**

- A. Formed concrete having any dimension smaller or greater than required, and outside the specified tolerance limits, will be considered deficient in strength and subject to additional testing as herein specified.
- B. Formed concrete having any dimension greater than required will be rejected if the appearance or function of the structure is adversely affected, or if the larger dimensions interfere with other construction. Repair, or remove and replace rejected concrete as required to meet the construction conditions. When permitted, accomplish the removal of excessive material in a manner to maintain the strength of the section without affecting function and appearance.

## **PART 13 - STRENGTH OF CONCRETE STRUCTURES**

- A. The strength of the concrete structure in-place will be considered potentially deficient if it fails to comply with any of the requirements which control the strength of structure, including the following conditions.
  - 1. Failure to meet compressive strength tests requirements.
  - 2. Concrete which differs from the required dimensions or location in such a manner to reduce strength.
  - 3. Concrete subjected to damaging mechanical disturbances; particularly load stresses, heavy shock, and excessive vibration.
  - 4. Poor workmanship and quality control likely to result in deficient strength.
- B. When there is evidence that the strength of the concrete structure in-place does not meet specification requirements, the concrete testing service shall take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:
  - 1. Take at least 3 representative cores from each member or area of suspect strength, from locations directed by the Architect.
  - 2. Test cores in a saturated-surface-dry condition per ACI 318 if the concrete will be wet during the use of the completed structure.
  - 3. Test cores in an air-dry condition per ACI 318 if the concrete will be dry at all times during use of the completed structure.
  - 4. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% and no single core is less than 75% of the 28-day required compressive strength.
  - 5. Report test results in writing to the Architect on the same day that tests are made. Include in test reports the project identification name and number, date, name of contractor, name of concrete testing service, location of test core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio) direction of applied load to core with respect to horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.
  - 6. Fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.
  - 7. Conduct static load test and evaluations complying with ACI 318 if the results of the core tests are unsatisfactory, or if core tests are impracticable to obtain, as directed by the Architect.
- C. Concrete work which does not conform to the specified requirements, including strength, tolerances, and finishes, shall be corrected at the Contractor's expense, without extension of time therefore. The Contractor shall also be responsible for the cost of

corrections to any other work affected by or resulting from corrections to the concrete work.

#### **PART 14 - JOINT MATERIALS**

- A. Preformed Expansion Joint Fillers: Type 1 - Standard - highly resilient.
- B. Joint Sealing Compound: Polysulfide sealants, elastomeric caulk; Hornflex by Construction Products Division, W.R. Grace & Company or an approved equal.

#### **PART 15 - MOISTURE BARRIER**

- A. Provide moisture barrier cover over prepared base material where shown on drawings. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:
  - 1. Polyethylene sheet not less than 10 mils thick.
  - 2. Water resistance barrier paper consisting of heavy Kraft paper laminated together with glass fiber reinforcement and overcoated with black polyethylene on each side.

#### **PART 16 - BONDING AGENT**

- A. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application complying with Mil B-19235.
- B. Provide concrete bonding agent as manufactured by one of the following or approved equal.
  - 1. Polyweld; Chem-Master Corp.
  - 2. Daraweld-PBA; W,R, Grace

#### **PART 17 - CONTROL JOINTS**

- A. Form control joints in concrete wall where shown and as detailed on the Drawings.

#### **PART 18 - CONCRETE CURING MATERIALS**

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd. and complying with AASHO M 182, Class 3.
- B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171:
  - Waterproof Paper
  - Polyethylene Film
  - White Burlap-Polyethylene Sheet
- C. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming

curing compound complying with ASTM C 309, Type I, unless other type acceptable to the Architect.

1. Products offered by manufacturers to comply with the requirements for membrane-forming curing compounds include the following:

Masterseal; Master Builder's Co.

Clear Seal; A.C. Horn/W.R. Grace

Kure-N-Seal; Sonneborn-Contech

Polyclear; Upco Chemical/USM Corp.

Clear Cure; L&M Construction Chemicals

Klearseal; Castle Chemical Corp.

LR-151; Protect Industries

## **PART 19 - PREPARATION**

- A. Before placing concrete, inspect and complete the form work installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts involved in ample time to permit the installation of their work; cooperate with other trades in setting such work, as required.
- B. Forms shall be constructed of materials as indicated for use and purpose intended. See Architect's Drawings also.
- C. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

## **PART 20 - CONCRETE PLACEMENT**

- A. Place concrete in compliance with the practices and recommendations of ACI 304, and as herein specified.
- B. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as practicable to its final location to avoid segregation due to handling or flowing. Do not subject concrete to any procedure which will cause segregation.
- C. Scream concrete which it is to receive other construction to the proper level to avoid excessive skimming or grouting.
- D. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials.

Do not use re-tempered concrete. Remove rejected concrete from the project site and dispose of in an acceptable location.

- E. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practicable by methods which will prevent segregation and loss of concrete mix materials.
- F. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.
- G. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- H. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
- I. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions. Vibration of forms and reinforcing will not be permitted, unless otherwise accepted by the Architect.
- J. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
- K. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- L. Bring slab surfaces to the correct level with a straight edge and strike off. Use bull flats or darbies to smooth the surface. Do not disturb the slab surfaces prior to beginning finishing operations.
- M. Maintain reinforcing steel in the proper position continuously during concrete placement operations.

## **PART 21 - BONDING**

- A. Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent, and clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in manner to expose bonded aggregate uniformly and not to levee laitance, loose particles of aggregate, or damaged concrete at the surface.

## **PART 22 - EXTERIOR AND INTERIOR WALLS**

- A. Grout air holes with mortar. Remove excess grout. Patches shall be ground to produce uniform surfaces, free of blemished and fins to the satisfaction of the Architect. Patches shall be kept continuously moist for a period minimum of six days.
- B. Fill tie holes after form oil have evaporated sufficiently for good bond as specified for patching operation above. Exposed walls shall receive a rubbed finish.
- C. At completion, concrete shall be of uniform texture and finish.

## **PART 23 - COLD WEATHER PLACING**

- A. Protect all concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.
- B. When the air temperature has fallen to or is expected to fall below 40 degrees F., provide adequate means to maintain the temperature in the area where concrete is being placed at either 70 degrees JF. for 3 days or 50 degrees F. for 5 days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Keep protections in place and intact at least 24 hours after artificial heat is discontinued. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.
- C. When air temperature has fallen to or is expected to fall below 40 degrees F. uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50 degrees F. and not more than 80 degree F. at point of placement.
- D. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.
- E. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators.

## **PART 24 - HOT WEATHER PLACING**

- A. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
- B. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.
- C. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
- D. Wet forms thoroughly before placing concrete.
- E. Use set-control admixtures when required and accepted in mix designs.

## **PART 25 - CONSTRUCTION JOINTS**

- A. Provide keyways at least 1½" deep in all construction joints in walls, slabs, and between walls and footings.
- B. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints.

## **PART 26 - FINISH OR FORMED SURFACES**

- A. Provide as-cast rough form finish to formed concrete surfaces that are to be concealed in the finish work or by other construction, unless otherwise indicated.
- B. Standard form finish shall be the concrete surface having the texture imparted by the form facing material used, with tie holes and defective areas repaired and patched and all fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- C. Provide smooth rubbed (SmRbd-Fn) to front exterior exposed concrete surfaces, which have received smooth form finish treatment, not later than the day after form removal.
- D. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown.
- E. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently to permit the operation of a power-driven float, or both. Consolidate the surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level the surface plane to a tolerance not exceeding 1/4" in 10' when tested with a 10' straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform smooth, granular texture.

## **PART 27 - CONCRETE CURING AND PROTECTION**

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper period of time necessary for hydration of the cement and proper handling of the concrete.
- B. Start initial curing as soon as free moisture has disappeared from the concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.
- C. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period.

## **PART 28 - CURING METHODS**

- A. Perform curing of concrete by moist curing, by moisture-retaining cover curing, by membrane curing, or by combinations thereof, as herein specified, optional to the Contractor with approval from the Architect.
  - 1. For curing, use only water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.
  - 2. Keeping the surface of the concrete continuously wet by covering with water.
  - 3. Continuous water-fog spray.
  - 4. Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive continuously wet. Place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a 4" lap over adjacent absorptive covers.
  - 5. Cover the concrete surfaces with the specified moisture-retaining cover for curing concrete, placed in the widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during the curing period using cover material and waterproof tape.
  - 6. Apply the specified membrane-forming curing compound to damp concrete surfaces as soon as the water film has disappeared. Apply uniformly in a 2-coat continuous operation by power spray equipment in accordance with the manufacturer's directions. Recoat areas which are subjected to heavy rainfall within 3 hours after initial application. Maintain the continuity of the coating and repair damage to the coat during the entire curing period.



7. Do not use membrane curing compounds on surfaces which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete, such as other concrete, liquid floor hardener, waterproofing, damp proofing, membrane roofing, flooring, painting and other coatings and finish materials, unless otherwise acceptable to the Architect.

## **PART 29 - CURING FORMED SURFACES**

- A. Cure formed concrete surfaces, including the undersides of girders, joist, beams, supported slabs and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

## **PART 30 - CURING UNFORMED SURFACES**

- A. Initially cure unformed surfaces, such as slabs and other flat surfaces by moist curing, whenever possible.
- B. Final cure unformed surfaces, unless otherwise specified, by any of the methods specified above, as applicable.
- C. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise acceptable to the Architect.

## **PART 31 - FINAL CURING OF CONCRETE**

- A. During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished surfaces from damage by subsequent construction operations.

## **PART 32 - MISCELLANEOUS CONCRETE ITEMS**

- A. Provide concrete grout for reinforced masonry lintels door jambs and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.
- B. Fill-in holes and opening left in concrete structures for the passage of work by other trades, unless otherwise shown or directed, after the work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide all other miscellaneous concrete filling shown or required to complete the work.
- C. Place dove tail slots in all concrete surfaces where concrete and masonry walls connect.
- D. The concrete in each integral unit of the structure shall be placed continuously, and the

Contractor shall not begin work without sufficient approved material on hand nor without sufficient forces and equipment to complete that unit without interruption in placing the concrete.

- E. Reinforce all walls, unless otherwise specified or shown on the drawings, with number five (5) bars at 12 inches on centers horizontal and vertical.
- F. Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- G. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on the drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of the manufacturer furnishing the machines and equipment.

### **PART 33 - CONCRETE SURFACE REPAIRS**

- A. Repair and patch defective areas with cement mortar immediately after removal of forms, but only when directed by the Architect.
- B. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean, dampen with water, and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to the Architect.
- C. For exposed-to-view-surfaces, blend white portland cement and standard portland cement so that, when dry, the patching mortar will match the color of the surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.
- D. Fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure complete filling.
- E. Repair of Unformed Surfaces: Test unformed surfaces, such as slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.
- F. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

- G. Repair finished unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectional conditions.
- H. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.
- I. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Architect.
- J. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4" clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with a neat cement grout coating, or use concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
- K. Repair isolated random cracks and single holes not over 1" in diameter by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean out dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with a neat cement grout coating. Place dry-pack before the cement grout takes its initial set. Mix dry-pack, consisting of one part portland cement to 2½ parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
- L. Repair methods not specified above may be used, subject to the acceptance of the Architect.

End of Section

## **SECTION 04200 - UNIT MASONRY**

### **PART 1 - GENERAL**

- A. This Section includes all labor, materials, equipment, and related items required for the work of unit masonry as shown on the Drawings and as specified.

### **PART 2 - SUBMITTALS**

- A. Duplicate samples of the following shall be submitted to the Architect for approval prior to the delivery of such materials to the project site.
  - 1. Sample of White colored, smooth face CMU.

### **PART 3 - PRODUCT HANDLING**

- A. Store all masonry units on screeds and under cover to properly protect from the elements until ready for use. Dirty, cracked, chipped, or otherwise damaged masonry units shall not be used.

### **PART 4 - ENVIRONMENTAL CONDITIONS**

- A. Masonry shall not be laid in freezing weather unless suitable means are used to heat the materials and protect the work from cold and frost, and to ensure that the mortar will properly harden without freezing.

### **PART 5 - PROTECTION**

- A. The Contractor shall protect exposed masonry materials of every kind against staining, and the tops of all walls shall be kept covered with non-staining waterproof covering at the end of each work day and at any time the work thereon is not in progress. When starting or resuming work at a new level, the top surface of the work in place shall be cleaned of all loose mortar and foreign materials and in drying weather thoroughly wetted with clean water. Then resume laying.

### **PART 6 - MATERIALS**

- A. Masonry Units:
  - 1. Concrete block for general use throughout the project shall be hollow, load-bearing concrete masonry units complying with ASTM C90, Grade N-1, shall have nominal 8" x 16 face, or as shown, shall have a compressive strength of not less than 800 p.s.i. for individual units and an average of 1,000 for five units.
    - a. Exterior CMU shall be waterproof with waterproof mortar.
    - b. All aggregates for concrete masonry units shall conform to ASTM C331, and shall be expanded shale produced by the rotary kiln process.
    - c. All units shall be made with Portland cement complying with ASTM C150, and weighing not more than 100 lbs. per cubic foot.

- d. All units shall be square, true, and have sharp arriser. They shall be of consistent texture, and shall be dimensionally stable with regard to height, width, and lengths. All units shall be free of organic impurities that will cause rusting, staining, or pop-outs, and shall contain no combustible matter.
- e. Steam Curing. All concrete blocks shall be steamed in an atmosphere of 100° F. for a period of 4 to 6 hours. Steam curing shall commence after masonry units have been allowed to "set" for a period of 1½ to 2 hours. After steam curing, allow kiln temperature to drop slowly before removing blocks from kiln. Blocks shall be stored for a period of 30 days and protected from the weather during this period before delivery to site.
- 1. Fire rated concrete block for use in interior shafts shall conform to general specifications for other concrete block set forth above, and shall conform to Underwriter's Laboratories D-2 classification for two-fire rating.
  - a. Manufacturer of concrete block units shall provide U.L. standard certificate certifying that materials furnished meet classification specified to the Architect for approval prior to delivery of units to the site.,

**B. Masonry Wall Reinforcement:**

- 1. Provide all prefabricated internal or external corners required by installation.
- C. Anchors and ties shall be of corrosion resistant metal equal in strength, size and numbers to conform with requirements of American standard A41.1 titled American Standard Building Code Requirements for Masonry.
  - 1. Truss type reinforcement for horizontal reinforcing at concrete masonry partitions. Reinforcement shall be Dur-O-Wall Truss No. 9 gauge cross rod or approved equal. All components of anchor to have a hot dipped galvanized finish. Place joint reinforcement directly on masonry and place mortar over wire to form bed joint.

**PART 7 - LAYING CONCRETE BLOCK**

- A. Lay all concrete block in exterior and interior wall construction where indicated, using Type N mortar furnished under work of Section 04100, except that Type S mortar shall be used in laying concrete block below grade.
- B. All bed and head joints shall be completely filled with mortar. Bed joints shall be filled by spreading a thick bed of mortar. Fill head joints with a heavy buttering of mortar on one side (each flange) of block, press the block down into the bed joint, and push the block into place so that the mortar squeezes out from the top and sides of the head joint. Mortar should correspondingly cover the end flange of the block before placing the next block. Attempting to fill joints by slushing or dashing will not be permitted. Partial filling of joints with mortar cut from the extruded bed joint will not be permitted. Where closures are

required, fill with mortar so that the intersection of the closure will extrude mortar, both laterally and vertically. Extend walls and partitions to heights indicated, building in around joist bearings, etc. as shown or required. Cut units as required to properly course in plan and vertical section as shown on the Drawings or as directed by the Architect. All cuts shall be accurately made with masonry saw.

- C. Joints and Bond. All concrete masonry units shall be laid in running bond. Joints in concrete block work shall be 3/8" wide for both head and bed joints. Joints in masonry scheduled to receive separate finish or where concealed in the work shall be cut flush. Rake joints 3/8" deep at control joints, where masonry abuts concrete surfaces, etc., and otherwise where shown on the Drawings, for caulking by others under work of Section 07900.
- D. Reinforcement. Concrete masonry walls and partitions shall be reinforced continuously in every other course, (16" o.c. vertically) using masonry wall reinforcement of types as hereinbefore specified. Reinforcement shall be seated in the mortar bed by lifting cross ties as work progresses. Lay internal and external corners and intersections as required for the completed job.
- E. Chases for pipes, conduits, etc. shall be plumb and smooth on the inside, with offsets formed where required, kept free of obstructions and cleaned out on completion. There shall be at least 8" of masonry between chases and the jambs of openings.
- F. Build units accurately to metal door frames, building in anchors furnished with frames. Slush solid with mortar at jambs and head.
- G. Coordinate work with other trades, building in all items shown to be installed in concrete block work such as lintels, anchors, sleeves, etc. Prepare openings as shown or required for proper installation of mechanical, electrical, and other items.
- H. Cleaning. Extreme care shall be exercised during laying to protect units from mortar droppings, etc. Upon completion of work, all exposed concrete block shall be properly cleaned with a stiff bristle brush to remove all excess mortar, dirt and stains. Do not use acid.
- I. Workmanship. The contractor is cautioned that the Architect will demand first class workmanship. All concrete masonry work shall be performed by experienced masons. Any chipped, cracked or otherwise damaged or defective work will be rejected.

End of Section

## **SECTION 07210 - BUILDING INSULATION**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Provide building insulation:
  - 1. Foundation walls, board type.

#### **1.02 SUBMITTALS**

- A. Submit for approval product data, test reports.

#### **1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instruction.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Board Insulation:
  - 1. Type: Extruded polystyrene, rigid ASTM C578.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections. Provide full thickness in one layer over entire area, tightly fitting around penetrations.
- B. Install extruded polystyrene at foundation.

End of Section

## **SECTION 07900 - JOINT SEALERS**

### **PART 1 - SCOPE**

- A. This Section includes all labor, materials, equipment, and related items required for the work of caulking as shown on the Drawings and as specified herein. Work under this Section includes but is not necessarily restricted to the following:
  - 1. Caulking of exterior or interior expansion or control joints in concrete or masonry.
  - 2. Other joints, exterior or interior, in the building construction shown, specified, or required to be caulked.

### **PART 2 - SUBMITTAL**

- A. Contractor shall submit to the Architect, in duplicate, for approval the following items prior to furnishing any materials at the job site.
  - 1. Sample cards of all exposed caulking and sealant for color approval. Unless otherwise directed, apply samples in minimum 3" runs on cards.
  - 2. One lineal foot of each type of backer material proposed.

### **PART 3 - PRODUCT HANDLING**

- A. Deliver caulking, and related accessories to the job site in factory sealed, unopened containers bearing manufacturer's name and product designation.
- B. Store materials in unopened containers, following manufacturer's recommendations for storage temperature and shelf life.
- C. Follow manufacturer's recommendation for handling products containing toxic substances. Keep flammable materials away from heat, sparks, and open flames. Use recommended solvents and cleaning agents for cleaning tools and equipment.

### **PART 4 - ENVIRONMENTAL CONDITIONS**

- A. Schedule caulking operations so that working joints are most likely to be normal size. Apply materials within manufacturer's recommended surface and ambient temperature range.

### **PART 5 - PROTECTION**

- A. Use masking tape where practicable to control lap of materials onto adjacent surfaces or to facilitate tooling. Remove tape immediately after caulking operation.



## **PART 6 - MATERIALS**

- A. General. All caulking, primers, and accessories shall be non-staining to adjacent exposed materials. Products having similar application and usage shall be of the same manufacturer and type. Unless otherwise specified, colors shall be selected from approved manufacturer's standard color sections. Use gun consistency compounds unless otherwise required by job conditions.
- B. Exterior caulking shall be a one or two-component polysulfide base, elastic, synthetic rubber compound, conforming to Federal Spec. TT-S-00230, and shall be "Sonolastic" as manufactured by the Sonneborn Building Products, Inc., "Synthacalk" as manufactured by the Pecora Chemical Corp., or "Rubber Calk 500" as manufactured by the Products Research & Chemical Corp or an approved equal.
  - 1. Colors shall be from manufacturer's standards as selected by the Architect.
- C. Interior caulking for general use shall be a one-component acrylic latex compound, and shall be "Sonolac" as manufactured by the Sonneborn Building Products, Inc. "AC-20" as manufactured by the Pecora Chemical Corp., or "Latex Caulk" as manufactured by DAP, Inc.
- D. Primers shall be as manufactured and recommended for each substrate by the manufacturer of each caulking compound used in the work.
- E. Backer materials shall be as recommended for and compatible with each caulking used, and shall be as follows unless otherwise required to meet specific job conditions.
  - 1. Backer rod for use in all joints requiring backer for caulking shall be a soft, closed cell polyethylene foam meeting requirements of AASHO Specifications M153-54, Type I and III, and shall be as manufactured by the Dow Corning Corp., Sonneborn Building Products, Inc., or Williams Products, Inc.
- F. Release material, where required, shall be polyethylene film.

## **PART 7 - MIXING**

- A. Job mix multi-component sealants with suitable power operated equipment, following specific directions of sealant manufacturer.
- B. Base and accelerator components of multi-part sealants shall have batch control numbers clearly indicated on containers. Control numbers for mixed components shall be identical.

## **PART 8 - CONDITION OF SURFACES**

- A. Inspect all surfaces to receive caulking materials, and report all defects. Starting work implies acceptance of surfaces as satisfactory. Verify that joints and spaces to be caulked are of proper width.

- B. Concrete surfaces shall be thoroughly cured.
- C. Apply no caulking materials in contact with surfaces contaminated with oil, grease, bituminous materials, form release agents, bond breakers, deleterious curing compounds, water repellents, and other special surface treatments. Aluminum surfaces shall be free of lacquer. Costs incurred by removal of such contaminants shall be borne by the trades responsible for their presence.

## **PART 9 - PREPARATION**

- A. Thoroughly clean all joints, removing all foreign matter such as dirt, dust, moisture, frost, rust, paint, lacquer, and protective coatings. Blow all joints free of loose particles.
- B. Use no cleaning solvents which leave residue. Wipe joints free of solvent using clean, dry white cloths or white lint less paper. Do not permit solvent to air dry.
- C. Follow manufacturer's directions for products and surfaces.

## **PART 10 - INSTALLATION**

- A. Unless otherwise required by these specifications, install materials in strict accordance with manufacturer's specifications and recommendations, using approved equipment.
- B. Usage of various materials shall be as specified under Article 6 above.
- C. Prime surfaces as recommended by the manufacturer's immediately prior to caulking or sealing. Make preliminary tests to ensure that primers will not stain exposed materials or deteriorate backer materials.
- D. Unless otherwise required by caulking manufacturer's specifications and recommendations, use backer material to control caulking and sealant depth as follows (depths measured at bond face).
  - 1. Polysulfide and Polyurethane Sealants. For joints up to 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.
  - 2. Acrylic Sealant. For joints 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.
  - 3. Do not twist or stretch preformed backer materials during installation.
- E. At joints subject to movement, where required by nature of backer material used or where sealant contacts back of joint, use release material between backer material or back of joint and sealer to confine adhesion to surfaces of materials being joined. Follow manufacturer's recommendation exactly.

- F. Neatly tool joints to slightly concave surface using tooling agent recommended by sealant manufacturers. Repair any air pockets exposed by tooling. Tool so as to compress material and improve adhesion to surfaces joined.

## **PART 11 - PATCHING**

- A. Patch or replace defective or damaged sealants as directed by the Architect. Be responsible for damage to adjacent surfaces caused by caulking and sealing operations.

## **PART 12 - CLEANING**

- A. Clean adjacent surfaces soiled by caulking and sealing operations. Remove wet material before it "sets". Follow manufacturer's recommendations for cleaning procedures. Cleaning agents shall not stain or be injurious to exposed surfaces nor shall they be potentially dangerous to glass and metal surfaces due to wash-off by rain.

END OF SECTION

## **SECTION 08100 - METAL DOORS AND FRAMES**

### **PART 1 - RELATED DOCUMENTS**

- A. General provisions of Contract, General and Special Conditions, and General Requirements apply to this Section.

### **PART 2 - DESCRIPTION OF WORK**

- A. Provide labor, materials, equipment, and services necessary for proper and complete installation of all hollow metal work.
- B. Include all view windows and side lights indicated on Drawings.
- C. Work Specified in Other Sections.
  - 1. Finish Hardware is specified in another Division 8 Section.

### **PART 3 - LABEL CONSTRUCTION**

Where Label Construction is indicated in Door and Frame Schedule, materials and construction of doors and frames shall be in accordance with and bear indicated resistive rating label of Underwriters' Laboratories, Inc.

### **PART 4 - SUBMITTALS**

Submit Shop Drawings for all work, indicating materials, uses, gauges, details of construction, connections to other work, fastenings, and anchors, to Architect for his review. Do not start fabrication until these Drawings are approved.

### **PART 5 - MATERIALS**

- A. Manufacturers offering products complying with requirements include:
  - Steelcraft Mfg. Co.
  - Republic Steel Corporation
- B. Materials used shall be of best quality of their respective kinds.
- C. Steel in general shall be cold rolled stretcher level, prime quality steel, of U.S. Standard gauge as specified under the various headings.
- D. Doors, frames and framed openings exposed to the exterior shall be fabricated of zinc coated steel in the gauges scheduled. The steel shall be hot dipped so as to provide a ductile coating, tightly adherent to the base steel. The zinc coating shall be an A60 coating in accordance with ASTM specification A525 (.6 oz. of zinc per sq. ft. of steel total coverage.)

## **PART 6 - HOLLOW METAL STEEL DOORS, POLYURETHANE CORE**

- A. Physical Properties:
  - “R” Factor: 11.1
  - “U” Factor: .09
  - Compression Strength: 3600 P.S.F.
- B. Doors shall be equal to those manufactured by The Steelcraft Manufacturing Company, Cincinnati, Ohio, and designated as:  
LF-18 (1-3/4", 18 guage steel)
- C. Doors shall be fabricated of:
  - 1. Cold rolled steel, interior.
  - 2. Galvanized steel with a zinc coating of .6 ozs. per square foot total, exterior.
- D. Door shall be flush with edge seams filled and ground smooth.
- E. Doors shall have 1/8" bevel in 2" on hinge and ground smooth.
- F. Doors shall have vertical mechanical interlocking seams on hinge and lock edges.
- G. Doors shall be provided with top and bottom inverted 14 gage steel channels spot welded within the door.
- H. Doors shall be mortised and adequately reinforced for all hardware.
  - 1. Mortised hardware reinforcements shall be drilled and tapped at the factory.
  - 2. Surface applied hardware shall be field drilled by others.
- I. Doors shall be reinforced internally with a 14 guage steel reinforcement for surface closers when specified.
- J. Out swinging exterior doors shall be provided with top caps for protection against weather and with a polyurethane core.
- K. Doors shall be phosphatized and receive one coat of baked on prime paint.

## **PART 7 - FRAMES**

- A. Fabricate frames of 16 ga. steel. Manufacturers offering products complying with the requirements include:
  - Steelcraft Mfg. Co.
  - Republic Steel Corp.
  - Fenestra, Inc.
- B. All frames shall have welded and mitered corners, equivalent to Steelcraft Type D-16. (Issue A).

- C. Frames in stud walls can be KD frames.
- D. Provide suitable anchors for jambs as required by wall construction. Provide a minimum of six (6) jamb anchors and two (2) base anchors per frame. Provide anchors as required for labeled frames.
- E. Reinforcing channels, where called for, shall be 12 gauge reinforcing channel in head.

## **PART 8 - HARDWARE REINFORCEMENTS**

- A. Accurately mortise, reinforce, drill, and tap at factory all work to receive hardware, except do drilling and tapping for door checks and brackets at building.
- B. Reinforcements shall be of ample size and thickness to stiffen work against strain of service required. Reinforcements for locks and escutcheons shall be box type with spring lead contacts for lock cases.
- C. Provide cover boxes in back of all hardware cutouts in combination type frames.

## **PART 9 - FINISH**

- A. All steel hollow metal work shall be phosphatized and receive one coat baked on prime coat.
- B. Each coat shall be baked on and sanded smooth.

## **PART 10 - INSTALLATION**

- A. Set frames in their proper locations, plumb and true and securely braced in position.
- B. Receive, store and protect and be responsible for all doors to be installed hereunder. Report immediately to Contractor shortages, damage, improper preparation, defective finishes and warped doors. Do not install any material not perfect in every respect.
- C. Inspect openings and frames to receive doors. Report damage or discrepancy affecting proper installation of units to Contractor, and have corrective work done in a suitable and satisfactory manner.
- D. Install doors in openings as indicated on Drawings in conformance with shop drawings and hardware schedule. Install doors so they hang plumb and true, with proper clearances using items of hardware scheduled for openings.
- E. Accurately set all frames and thoroughly and rigidly anchor and fasten in place in building construction. Weld drywall anchors to frames.
- F. Check frames before and after walls are constructed to see that they are properly erected.

End of Section

## **SECTION 08361 - SECTIONAL INSULATED OVERHEAD DOORS**

### **PART 1 - GENERAL**

#### **1.01 Related Documents**

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

#### **1.02 Description of Work**

- A. Extent of sectional insulated overhead doors are shown on drawings.
  - 1. Furnish and install motor operated sectional steel insulated overhead doors.

#### **1.03 Quality Assurance**

- A. Provide each sectional insulated overhead door as a complete unit produced by one manufacturer, sections, brackets, guides, tracks, counterbalance mechanisms, hardware, weatherstripping and installation accessories, to suit openings and head room allowable.
- B. Provide setting drawings, templates, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.
- C. Wind Loading: Design and reinforce sectional overhead doors to withstand a 30 lb. per sq. ft. wind loading pressure.

#### **1.04 Submittals**

- A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead door. Include manufacturer's operating instructions and maintenance data.
- B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturer's data.

### **PART 2 - PRODUCTS**

#### **2.01 Acceptable Manufacturers**

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
  - 1. Overhead Door Corporation.
  - 2. Ideal Door Company.
  - 3. Equivalent as approved.
- B. Standard of quality for electrically operated sectional steel overhead door shall be 591

Series, commercial thermacore insulated steel sectional door as manufactured by Overhead Door Company, or equal.

C. Door #8, provide (5) 24" x 7" acrylic lights.

1. Additional accessory for door #8: remote radio control system.

## 2.02 Steel Section Doors

A. Weather Seals: Rubber tube seals shall be fitted inside every joint between sections to prevent air infiltration. Top section of door shall have EPDM rubber sealing strip. Provide standard jamb seals. Provide EPDM double bottom sealing weatherstrip.

B. Insulating Value of Door: R 14.86.

C. Finish: Exterior and interior of door sections shall receive shopbaked on primer ready for job finish paint in color as selected by Architect.

D. Door sizes shall be as indicated on the drawings.

## 2.03 Tracks, Supports and Accessories

A. Tracks: Provide manufacturer's standard galvanized steel tracks for door indicated. Size tracks for door size and weight, and designed for clearances shown. Provide complete track assembly including brackets, bracing and reinforcing required for rigid support. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Bolt to track supports.

B. Provide high lift.

## 2.04 Hardware

A. Provide standard, rust-resistant hardware, with galvanized or cadmium-plated or stainless steel fasteners, to suit type of door.

B. Hinges: Provide standard galvanized steel hinges per manufacturer's recommendations for size of door. Attach hinges to door sections.

C. Rollers: Provide standard galvanized rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track.

D. Provide electric operation Overhead Door Model SEL ½HP 208V Single Phase.

1. All overhead doors: pushbutton control stations should be located on interior side.

## 2.05 Counterbalancing Mechanisms



- A. Torsion Spring: Hang door assembly for operation by torsion spring counterbalance mechanism, consisting of adjustable tension tempered steel torsion springs mounted on a case-hardened steel solid shaft, and connected to door with galvanized aircraft type lift cable.

### **PART 3 - EXECUTION**

#### **3.01 Installation**

- A. Door shall be installed by manufacturers authorized dealer. Install door rack, and operating equipment complete with necessary hardware anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, and manufacturer's instructions, and as herein specified.
- B. Provide bracing, and reinforcing as required for rigid installation of track and door operating equipment.
- C. Upon completion of installation, including work by other trades, lubricate test and adjust door to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION

## **SECTION 08410 - ALUMINUM WINDOWS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division - 1 specification sections, apply to Work of this Section.

#### **1.02 DESCRIPTION OF WORK**

- A. Extent of aluminum windows is shown on drawings and schedules.
- B. Types of aluminum windows required include the following:
  - 1. Exterior and Interior
- C. Glazing: Refer to "Glass and Glazing" section of Division 8 for glazing requirements for aluminum entrances, curtain wall and windows, including doors.
- D. Sealant around perimeter of aluminum frames is specified elsewhere in Division 7 section.
- E. Comply with provisions of Section 01028 - Modification Requirements.

#### **1.03 SYSTEM PERFORMANCES**

- A. General: Provide exterior windows assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
- B. Thermal Movement: Allow for expansion and contraction resulting from ambient temperature range of 120°F (49°C).
- C. Wind Loading: Provide capacity to withstand loading indicated below, tested per ASTM E 330.
  - 1. Uniform pressure of 30 psf inward and 30 psf outward.
- D. Transmission Characteristics of Fixed Framing: Comply with requirements indicated below for transmission characteristics and test methods.
  - 1. Air and Water Leakages: Air infiltration of not more than 0.06 CFM per sq. ft. of

fixed area per ASTM E 283 and no uncontrolled water penetration per ASTM E 331 at pressure differential of 8.0 psf (excluding operable door edges).

- E. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below for transmission characteristics and test methods.
  - 1. Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E 283 at pressure differential of 1.567 psf.

#### 1.04 QUALITY ASSURANCE

- A. Drawings are based on one manufacturer's standard aluminum entrance, curtain wall and windows system. Another standard system of a similar and equivalent nature will be acceptable when differences do not materially detract from design concept or intended performances, as judged solely by Architect.

#### 1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of aluminum entrances and curtain wall and windows required for Project, including test reports certifying that products have been tested and comply with performance requirements.
- B. Shop Drawings: Submit shop drawings for fabrication and installation of aluminum entrances and curtain wall and windows, including elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.

#### 1.06 SPECIAL PROJECT WARRANTY

- A. Provide written warranty signed by Manufacturer, Installer, and Contractor agreeing to replace aluminum entrances, curtain walls and windows which fail in materials or workmanship within 3 years of acceptance. Failure of materials or workmanship includes excessive leakage or air infiltration, excessive deflections, faulty operation of entrances, deterioration of finish or construction in excess of normal weathering, and defects in hardware, weatherstripping, and other components of the work.

### **PART 2 - PRODUCTS**

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. YKK AP America
  - 2. Kawneer Company, Inc.

3. PPG Industries, Inc.
4. Tubelite Div., Indal Inc.
5. Amarlite/Arco Metals Co.

## 2.02 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
  1. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal.
  2. Provide Phillips flat-head machine screws for exposed fasteners.
- C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- D. Concrete/Masonry Inserts: Cast iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- E. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
- F. Compression Weatherstripping: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D 2000 or molded PVC gaskets complying with ASTM D 2287. Weatherstripping shall be equal to Kawneer Sealair Weathering System which shall include head and jamb, astragal, and bottom weatherstripping.
- G. Glazing Materials: Provide manufacturers standard EDPM glazing gaskets.
- H. Sealant: Provide all sealant necessary within aluminum assemblies. Perimeter sealant around frames shall be included under Section 07900.

## 2.03 FABRICATION

- A. General - Sizes and Profiles: Required sizes for frame units, including profile requirements, are indicated on drawings.
  1. Details shown are based upon standard details by manufacturer indicated. Similar details by other manufacturers listed will be acceptable, provided they comply with other requirements, including profile limitations.
- B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing,

hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.

1. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
  2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- C. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.
- D. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- E. Fasteners: Conceal fasteners wherever possible.
- F. Weatherstripping: For exterior windows, provide compression weatherstripping against fixed stops.

#### 2.04 ALUMINUM WINDOWS

- A. All exterior windows: YKK Model YES 45TU System (2" x 4½") for 1" glazing, thermally broken or equal.
1. YES 40FS interior aluminum frame, 1¾" x 4" non-insulated.

#### 2.05 FINISH

- A. All exposed aluminum surfaces shall be free of scratches and other serious blemishes.
1. Finish shall be YKK standard YB5N, dark bronze.

### **PART 3 - EXECUTION**

#### 3.01 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of aluminum entrances, curtain wall and windows.
- B. Drill and tap frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- C. Set sill members and other members in bed of sealant to provide weathertight

construction.

- D. Refer to "Glass and Glazing" section of Division 8 for their installation of glass shown to be glazed into doors and framing.

### 3.02 ADJUST AND CLEAN

- A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weatherstripping.
- B. Clean completed system, inside and out, promptly after erection and installation of glass and sealants. Remove excess glazing and sealants, dirt, and other substances from aluminum surfaces.
- C. Institute protective measures and other precautions required to assure that aluminum entrances and curtain wall and windows will be without damage or deterioration other than normal weathering at time of acceptance.

END OF SECTION

## Section 08 45 1 Structured Polycarbonate Panel Assemblies

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. The design and manufacture of an aluminum framed system, glazed with UV resistant translucent cellular polycarbonate glazing panels.
- B. All anchors, brackets, and hardware attachments necessary to complete the specified assembly, when included within project scope.
- C. Weatherability and water-tightness performance as specified.
- D. All flashings up to adjoining work are also required as part of the system and shall be included, unless specifically noted as being supplied by others.
- E. Installation of the system.

#### 1.2 RELATED SECTIONS

- A. Masonry: *Division 04*
- B. Metal Fabrications: *Division 05*
- C. Structural Steel: *Division 05*
- D. Sealants: *Division 07*
- E. Flashing and Sheet Metal: *Division 07*

#### 1.3 SYSTEM DESCRIPTION

- A. Aluminum canopy frame glazed with translucent cellular polycarbonate standing seam panels joined one to another by continuous U-shaped battens.
- B. Design Requirements:
  - 1. Support structure, constructed of materials of adequate load bearing capacity and to maintain visual design concepts, and for attachment to and support of the specified system, supplied by other trades.
  - 2. Glazing panels, extruded and supplied in one single length whenever possible. In the event transverse connections are required, they shall be designed, manufactured, and installed as integral elements of the system. In addition, they shall be extruded with integral upright, toothed elements, perpendicular to the main panel body.
  - 3. Whenever possible, fasteners shall be concealed.
  - 4. System shall be dry glazed.
  - 5. Bottom edges of glazing panels shall rest on [a continuous integral setting fin] [non-continuous supports], which is [are] designed to allow atmospheric air to reach their bottom edges, which shall be covered by a continuous air permeable tape. EPDM, silicone rubber, or neoprene setting blocks, or any other support method that would tend to restrict the flow of air through the panels is not acceptable.
  - 6. Air permeable tape shall also be applied to the top edge of the glazing panels.
  - 7. Unrestricted thermal movement of the glazing panels shall be allowed to occur within the framing system without compromising its weathertightness.
  - 8. The rabbet depth of all framing members shall, at a minimum, be based on a 3/4" (.75") engagement of the glazing panel, plus 1/8" (.125") cutting tolerance, plus .005 x the glazing dimension (in inches) that affects that rabbet. For example, a glazing panel that

is 100" long will require a minimum rabbet depth of  $.75" + .125" + (.005 \times 100") = 1.375"$ .

9. The system shall be designed and manufactured so that the battens will be placed on the exterior side of the installation.

C. Performance Requirements:

1. Air Infiltration: Not to exceed 0.003 cfm/sq. ft. of glazing area when tested at a pressure of 6.24 psf (0.03 kPa) in accordance with ASTM E-283.
2. Water Penetration: None when tested vertically at a pressure of 20 psf (0.0575 kPa) in accordance with ASTM E-331.
3. Structural Performance: The system shall be capable of supporting the design loading for this project as listed below:
  - a. Positive Wind Load: 80 psf
  - b. Negative Wind Load: 54 psf
  - c. Snow Load: 20 psf

Testing by a certified independent testing laboratory, in accordance with ASTM E-330, shall evidence this. In addition, the deflection of all framing members oriented normal to the glazing plane shall not exceed  $L/175$ .

#### 1.4 SUBMITTALS

- A. Submit three (1) each of the following to the Architect for review at the same time the Shop Drawings are submitted:

1. Each aluminum frame section – 6" long.
2. Samples of aluminum illustrating the specified finish.
3. Samples of glazing, each minimum 6" x 6", in specified color.
4. Test reports.
5. Product Data.

- B. Shop Drawings:

1. Shall include plans and/or elevations and details of the system and its installation. Flashings, sealants, and anchorage shall be clearly indicated.
2. Shall note gauges of brake metal, the finish(es) on the framing members, and any other information necessary to properly describe and install the system.

#### 1.5 QUALITY ASSURANCE

- A. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacture of glazing systems using cellular polycarbonate panel systems



for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of five (5) years.

- B. Erection shall be by the manufacturer or an installer experienced in erection of systems of the type specified.
- C. The manufacturer shall be responsible for the configuration and fabrication of the complete system, and will ensure that it fully meets all requirements of this specification.
- D. Approved Manufacturers: All manufacturers acceptable for use on this project under this section must be approved prior to bid. Manufacturers must submit evidence of compliance with all performance criteria specified herein. Any exceptions taken to this specification must be noted on the approval request. If approval is granted and non-compliance is subsequently discovered, the previously given approval will be invalidated and use of the product on the project will be disallowed. Requests for approval, with all test reports, submittals, and samples as specified herein, must be received no less than twelve (12) days prior to bid date. A list of all approved manufacturers and products will be issued by addendum. No verbal approvals will be given.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to the jobsite in the manufacturer's original and unopened containers and bearing labels as to type of material and manufacturer's name. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry, clean location, off the ground. Remove from the jobsite any materials that are damaged or otherwise not suitable for installation and replace with acceptable materials.
- C. Protective coverings containing PVC shall not be used in contact with polycarbonate.

## **1.7 WARRANTY**

- A. The Manufacturer shall provide a written warranty certifying that if, within one (1) year from the shipment date of the system, the system experiences water leakage owing to defects in fabrication or materials, the Manufacturer will, in a timely manner, furnish (only) new components to replace all of those found to be defective.
- B. The above warranty does not apply in the cases of structural movement of the building(s), negative air pressure inside the building(s), acts of God, alteration or abuse of the products, or unreasonable use.
- C. The liability of the Warrantor shall be limited to the above and shall not include incidental or consequential damages of any kind.
- D. The polycarbonate or glass glazing materials or any other materials or system (example... finishes on metals) furnished and warranted by others, shall be covered by only those warranties.
- E. These additional written warranties will also be provided:
  - 1. The polycarbonate manufacturer's ten (10) year prorated warranty against defective materials, color change and damage.

2. The framing finish applicator's warranty as specified below :
  - a. Anodized Finish: One (1) year from date of application against chalking, fading, cracking, crazing, and blistering.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER AND PRODUCT**

- A. EXTECH/Exterior Technologies, Inc., 200 Bridge Street, Pittsburgh, PA 15223; Phone (800) 500-8083, Fax (800) 500-8012, website [www.extechinc.com](http://www.extechinc.com) or approved equal.
- B. Series #3100 Standing Seam Cellular Polycarbonate Translucent Canopy System.

### **2.2 MATERIALS**

#### **A. Framing:**

1. Shall be extruded aluminum of 6063-T5, 6005-T5 or 6105-T5 alloy and temper. All sections shall be formed true to detail and free from defects impairing appearance, strength or durability.
2. Aluminum batten end cover caps shall be provided where polycarbonate battens terminate. Plastic friction or adhered batten end caps shall not be permitted.
3. Thermally broken perimeter aluminum framing members, exclusive of cover caps, shall incorporate an integral structural polyurethane thermal break.

[OR]

4. Non-thermally broken perimeter aluminum framing members.

#### **B. Glazing Gaskets:**

1. Shall be elastomeric, having low friction surfaces on all interfaces between glazing and polycarbonate.
2. Shall be tested for chemical compatibility with the glazing, and test reports evidencing same shall be presented to the Architect.

#### **C. Fasteners:**

1. Where exposed, shall be stainless steel, 300 Series, with stainless steel backed neoprene washers.
2. Concealed fasteners they may be stainless or zinc-plated steel in accordance with ASTM Specifications A165-55 or A164-55.
3. Bolts, anchors and other fastening devices shall be as required for the strength of the connections and shall be suitable for conditions encountered. Washers shall be of the same metals as fasteners.

#### **D. Flashing:**

1. Minimum 0.040 thick Aluminum [painted finish: 3105-H14] [anodized finish: 5005-H34].
2. Factory formed to required profile(s) in 10-ft lengths, whenever practical, to allow for field trimming to suit as-built conditions.
3. The finish on this metal shall match as closely as possible that which is on the extruded aluminum framing members.

E. Polycarbonate Glazing Panels and Battens:

1. Appearance:
  - a. The extruded panels shall be uniform in color with an integral extruded multi-cell core. The panel's exterior skins shall be interconnected and spaced apart by continuous perpendicular supporting ribs. The space between the two exterior skins, in a cross section, shall be divided by multiple parallel intermediate walls.
  - b. Panels shall consist of a polycarbonate resin with permanent, co-extruded, ultraviolet (UV) protective layers on both sides of the panels. These protective layers shall be co-extruded by the manufacturer during the original extrusion of the panel and shall be a permanent part of both the interior and exterior of the panels. Post-applied coating or films of dissimilar materials are unacceptable. Battens shall be of similar UV resistant co-extruded polycarbonate materials.
  - c. Panels shall be 20mm (25/32") thick, exclusive of the perpendicular toothed elements incorporated into each side, and shall be 600mm (23-5/8") wide.
  - d. Panel weight shall be nominally [0.65] [0.71] lbs. per sq. ft.
  - e. Color (Panel): \_\_Clear\_\_
  - f. Color (Batten): \_\_Clear\_\_
  - g. Friction fit or adhered plastic batten end caps shall not be permitted.
2. Solar Performance:
  - a. Light Transmission (LT %): \_\_42%\_\_
  - b. Shading Coefficient (SC): \_\_0.46\_\_
3. Attachment:
  - a. Two-piece sliding clips, consisting of an aluminum base portion and a stainless steel upper portion which constrains the polycarbonate sheets. The base shall be designed so as to hold the polycarbonate panels above the substrate as well as above the heads of the fasteners which attach it to the substrate. In addition, this base will incorporate low friction elastomeric cushions on which the panels can rest and/or move.

4. Flammability:

- a. The panel shall have a CC1 fire rating classification when tested in accordance with ASTM D-635 or equivalent.
- b. The panel shall have a Class C flame spread and smoke development rating when tested in accordance with ASTM E-84.

## **2.3 FABRICATION**

- A. Construct canopies using extruded aluminum members.
- B. Carefully and accurately design, fabricate and assemble work with proper provision for thermal contraction and expansion. Work shall conform to profiles and sections noted on the shop drawings. Work shall be assembled with joints in a neat and finished manner.
- C. Field cutting or slitting of standing seam panel up-legs is not permitted.
- D. All framing members shall be factory fabricated and assembled to the greatest degree possible, including the following:
  - a. Cutting members to length.
  - b. Installation of glazing gaskets, to be glued within extruded gasket tracks.
  - c. Drilling straight and countersunk mounting holes, fastener access holes, and weep holes.
  - d. Fabricating miter joints with concealed joint reinforcements and joint gaskets.
  - e. Installation of non-metallic thermal isolation spacers.
  - f. Removal of extrusion portions to accommodate tight over-lapping joinery and connections, including coped ends, mid-span notches, etc.
  - g. Fabrication and installation of splice plates at jointed connections.

## **2.4 FINISHES**

- A. Exposed surfaces of the aluminum framing members shall be finished as follows:
  - 1. Anodized Coatings:
    - a. Architectural Class I Color Anodized type AA-M10C22A44 electrolytically deposited complying with AAMA 611, 0.7 mil thick minimum. Color selected by Architect from full range of colors.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. All submitted opening sizes, dimensions and tolerances are to be field verified by the installer unless otherwise stipulated.

- B. Installer to examine site conditions to verify readiness. Notify general contractor or owner about any defects requiring correction, including but not limited to improperly sloping sill substrates and uneven planar substrates. Do not work until conditions are satisfactory.

### **3.2 INSTALLATION**

- A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners and hardware for material attachments as specified.
- B. Use methods of attachment to structure which include provisions for thermal movement.
- C. Glazing shall be installed in accordance with panel and system manufacturer's guidelines.
- D. Remove all protective coverings on polycarbonate panels during or immediately after installation.
- E. Installation shall be performed by a company with ten (10) years continuous experience in commercial construction.
- F. Protect contact points between unprotected dissimilar metals (except stainless steel) using continuous separators of FRP, PVC tape (or approved equal)
- G. Field or factory horizontal slitting of panel up-legs is not permitted.

### **3.3 CLEANING AND PROTECTION**

- A. During installation, protect exposed surfaces against accumulation of paint, caulking, disfiguration and damage.
- B. Interior glazing surfaces shall be cleaned as the panels are being installed. The exterior shall be cleaned as each phase of the work is completed.
- C. Follow panel manufacturer instructions when cleaning exposed panel surfaces. Clean polycarbonate and frame at time of installation.
- D. Follow panel manufacturer's guidelines when removing foreign substances from panel surfaces. Use only solvents that are deemed acceptable for use.
- E. Before final acceptance, repair and/or replace any defective materials or work.

END OF SECTION

## SECTION 08710

### PART 1 - GENERAL

#### 1.1 Related Documents

Drawings and general provisions of contract and Division 1 specification sections, apply to work of this section

#### 1.2 SUMMARY

This section **DOES INCLUDE** Aluminum door hardware as noted in sets.

Work under this heading includes furnishing all hardware to respective trades. The hardware supplier shall promptly furnish templates to all manufacturers furnishing materials necessary for completion of this part.

Extent of finish hardware is indicated on drawing and in schedules.

The following specifications are a guide and a description of the quality materials required. No material of quality or weight less than outlined in this specification will be accepted. The contractor will be responsible for supplying the correct quantity of all materials, whether or not specifically mentioned in this specification. Any additional items that may be required shall be furnished and be of type, quality, and utility consistent with other hardware specified.

#### 1.3 SUBMITTALS

##### **ARCHITECT'S HARDWARE SCHEDULE:**

Architect's hardware schedule is by hardware set number. Refer to drawings for designation of hardware set number applicable to each opening. Certain additional items of hardware and/or hardware accessories specified herein shall be finished and noted on the hardware schedule.

##### **SUPPLIER'S HARDWARE SCHEDULE**

A complete hardware schedule, indicating type, number, location, and finish shall be submitted to architect for approval, together with such samples as may be required for review. Opening numbers shall be same as used in contract documents. Schedule shall be prepared according to Door and Hardware Institute recommendations (schedule and sequence format) and shall include degree of door closer installation.

Supplier's hardware schedule will be reviewed by architect for type, quality, finish, and for function (other than hand). Contractor shall be responsible for checking schedule for correct hand of locksets and for supplying quantity of items required by contract documents.

Provide supplementary or revised hardware schedules if deemed necessary by architect.

Do not ship or deliver hardware to job prior to review of hardware schedules by architect.

Hardware schedule shall be submitted in the following format. Hardware schedules submitted to architect for review not in this format will be rejected:

## **HARDWARE HEADING 1**

1 Sgl Door #001      Exterior      from      Corridor      RHR 90 deg  
Each leaf 3'0 x 7'0 x HMF xNLWD

Item, quantity, manufacturer's#, size, product type, finish, and product information

3 ea Hinge	5BB1 NRP	4.5 x 4.5	630	IV
1 ea Cylinder	951 x GGMK		626	FA
1 ea Exit Device	25R L Dane	3070 RHR WO	626	FA
Etc.				

### **1.4 QUALITY ASSURANCE**

All hardware shall be furnished by an established Builders Hardware firm who maintains and operates an office, display, and stock in this area, and who is a regular authorized distributor of the lock he proposes to furnish. All hardware schedules submitted for approval shall carry the signature and seal of a certified Architectural Hardware Consultant who is employed by the hardware firm supplying material.

### **1.5 PROJECT CONDITIONS**

Delivery storage and handling: Hardware supplier shall receive and check all hardware at his warehouse. Drop shipments to the jobsite from various manufacturers will not be permitted. All hardware shall be in its original packaging and plainly labeled and numbered to agree with the numbers and as listed in the hardware schedule. The contractor shall submit his schedules for approval to the architect before proceeding with any work. When required, hardware supplier shall deliver hardware and/or hardware templates to the various door manufacturers. The general contractor shall provide storage facilities for the finish hardware after delivery to the job site.

### **1.6 ITEMS NOT INCLUDED**

Hardware for metal windows, toilet partitions, cabinets, access panels, etc. is not included in this section. See other sections for hardware to be furnished by others. Reference Division 16 for electrical requirements.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

Numbers given in this schedule are of the following manufacturers.

<u>PRODUCTS</u>	<u>MFG. SPECIFIED</u>	<u>APPROVED EQUAL</u>
Hinge/Cont. Hinge	Ives	Hager, Bommer
Locks	Falcon	Schlage, Sargent
Exits	Falcon	Von Duprin, Precision
Closers	LCN	Dorma, Sargent
Trim/Auxiliary	Ives	Rockwood, Hager
Weather Strip	Hager	Pemko, NGP

## 2.2 HARDWARE FINISHES

The designations used to indicate hardware finishes are those listed in ANSI /BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. finishes, shown by certain manufacturers for their products.

1.	Butt Hinges	US26D (652) Satin Chromium US32D (630) Satin StainlessSteel
2.	Mortise Cylinders, Rim Cylinders,	US26D (626) SatinChromium
3.	Cylindrical Latch sets andLocksets Mortise Latch sets	US26D (626) Satin Chromium US26D (626) SatinChromium
4.	Exit Devices	US26D (626) Satin Chromium
5.	Door Closers	ALUM (689) Powder Coated Aluminum
6.	Wall and Floor Stops	US32D (626) Satin StainlessSteel
7.	Door Pulls	US32D (630) Satin StainlessSteel
8.	Push Plates	US32D (630) SatinStainless Steel
9.	Mop, Kick, and Armor Plates	US32D (630) Satin StainlessSteel
10.	Saddle Thresholds	MillFinish Aluminum, Uncoated
11.	Door Sweeps	628 (US28) Satin Aluminum, Clear Anodized
12.	Self- Adhesive Seals	Clear (Silicone)
13.	Perimeter Seals	628 (US28) Satin Aluminum, Clear Anodized
14.	Door Silencers	Gray Gray (Rubber)

## 2.3 HINGES

Characteristics:

- a. Tested to be in accordance with ANSI/ BHMAA156.1.
- b. Templates: Provide only template-produced units.
- c. Fasteners: Provide Phillips flat-head screws complying with the following requirements.
  - (1) For metal doors and frames, install machine screws into drilled and tappedholes.
  - (2) For wood doors and frames, install threaded-to-the-head wood screws.



- (3) For fire-rated wood doors, install #12 x 1-1/4 inch, threaded-to-the-head steel woodscrews.
  - (4) Finish screw heads to match surface of hinges or pivots.
- d. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - (1) Out-Swing Exterior Doors: Non-removable pins.
  - (2) Out-Swing Interior Doors: Non-rising pins and Non-removable pins; as indicated in the Door Hardware Sets.
  - (3) In-Swing Exterior/ Interior Doors: Non-rising pins.
  - (4) Tips: Flat button and matching plug. Finished to match hinge leaves.
- e. Size: Size hinges in accordance with the specified manufacturer's published recommendations.
- f. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high.

Furnish one additional hinge for each additional 2-1/2 feet or fraction thereof.

## 2.4 CYLINDERS and KEYS

Characteristics:

- a. Tested to be in accordance with ANSI / BHMA A156.28.
- b. Falcon Key System: Except as otherwise indicated, provide a NEW Key System for this Project.
- c. Equip all cylinders and locksets with a 7-pin core.
- d. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
- e. Comply with the Owner's instructions for keying requirements and, except as otherwise indicated, provide individual change keys for each lock that is not designated to be keyed alike with a group of related locks. All keys are to be provided as noted:
  - (1) Permanently inscribe each key with the cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".
- f. A key meeting between the Owner and a representative of the successful finish hardware distributor shall be arranged subsequent to the return of the Approved Finish Hardware Schedule. A keying schedule will be established by the finish hardware distributor's representative and submitted to the Owner, for Approval. After the Owner's review, the keying schedule shall be returned to the distributor's representative such that the Permanent keyed locks can be prepared on a timely basis.
- g. Permanent keys will be transmitted directly to the Owner by the Finish Hardware Distributor.
- h. Key Material: Provide keys of nickel silver only.
- i. Key Quantities: Furnish the following quantities of keys for the entire project.
  - (1) Five (5) Each - Master Keys
  - (2) Three (3) Each - Permanent Change Keys  
(For Each Keyed Door Opening)

## **2.5 CYLINDRICAL LATCHSETS AND LOCKSETS:**

N/A

## **2.5 MORTISE LOCKSETS**

N/A

## **2.6 EXIT DEVICES:**

Characteristics:

- a. Tested to be in accordance with ANSI A156.3, 1994, Grade 1. All exit devices to be heavy duty, with one-piece removable covers. The housing shall be manufactured from extruded aluminum without exposed screws or rivets.
- b. Exit Devices shall be "UL" listed for Life Safety. All exit devices for fire-rated door openings shall have "UL" labels for "Fire Exit Hardware".  
All exit devices shall conform to NFPA 80 and NFPA 101 requirements.
- c. All series exit devices shall be "touchpad" (modern) types, incorporating a hydraulic fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with the exit device operation.  
All exit devices shall be non-handed. The touchpad shall extend a minimum of 1/2 of the door width and shall be a minimum of 2-3/16" in height. Plastic touchpads shall not be acceptable. The touchpad height shall exceed height of mechanism case or rail assembly to eliminate "Pinch Points". If the touchpad height does not exceed the height of the mechanism case or rail assembly, provide a factory installed insert / filler on the top and bottom of the touchpad along the mechanism case and rail assembly; to prevent "Pinch Points".
- d. All latch bolts to be the deadlocking type. Latch bolts shall have a self-lubricating coating to reduce wear.  
Plated or plastic coated latch bolts shall not be acceptable.
- e. All metal end caps to be standard with all exit devices.
- f. Exit device strikes, where surface applied, shall be a roller type and have an anti-slip mounting plate.
- g. All outside exit device trim shall be forged brass, full escutcheon. The lever trim shall be a "breakaway type" with substantial resistance to rotation when locked but allowing the vandalized lever to drop to a vertical, 90 degrees, position when more than 35 pounds of torque is applied.
- h. The exit device end caps shall be secured with three (3) screws to a truss bracket.
- i. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, plated to the standard architectural finishes to match the balance of the door hardware.

## 2.7 CLOSERS

### Characteristics:

- a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder; which have been tested and certified under ANSI/ BHMA Standard A156.4, Grade 1.
- b. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F (49 degrees C) to -30 degrees F (-35 degrees C).
- c. Spring power shall be continuously adjustable over the full range of closer sizes, and allowing for reduced opening force for the physically handicapped. Hydraulic regulations shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed and back check.
- d. All closers shall have solid forged steel main arms (and forearms for parallel arm closers) and where specified shall have a spring loaded stop in the soffit shoe ("SPRING CUSH-N-STOP"); as indicated in the Door Hardware Sets. Where door travel on out-swing doors must be limited, use SPRING CUSH-N-STOP type closers. Auxiliary stops are not required when SPRING CUSH-N-STOP type closers are used.
- e. All closers shall have non-metallic full, plastic, covers, which provides complete enclosure.
- f. All closers shall be certified to exceed Ten Million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers shall be of one manufacturer and shall maintain the manufacturer's ten year warranty.
- g. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ADA and ANSI A117.1 provisions for door opening force.
- h. All closers shall be attached utilizing Through Bolts with Wood and Machine Screws ("TBWMS").
- i. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
- j. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.  
**Lacquer or painted finish on metal components shall not be acceptable.**

## 2.8 PUSH AND PULL UNITS

### PULL UNITS:

### Characteristics:

- a. Tested to be in accordance with ANSI/ BHMA A156.6, Grade 1.
- b. Door Pulls shall be made of 1" diameter material, Semi-Circular offset, 11" Center-To-Center length, with a minimum of a 3-1/4" projection, and a 2-1/4" clearance. The door pulls shall comply with the recommendations of the Americans with Disabilities Act (A.D.A.).

- c. Provide door pulls with 1/8" thick base washers; as indicated in the Door Hardware Sets.
- d. Fasteners: Provide two (2) 5/16-18 x 2-1/4" machine screws with 1" Diameter Decorative Thru-Bolts.

#### **PUSH PLATES:**

##### **Characteristics:**

- a. Tested to be in accordance with ANSI/ BHMA A156.6, Grade 1.
- b. Push Plates shall be made of .050" wrought, stainless steel material.
- c. Where detailed, provide 3 %" x 15" plate with round corners.
- d. Where detailed, provide push plates engraved with the word "PUSH" vertically
- e. Provide exposed, Phillips oval head, stainless steel, sheet metal screw, mounting fasteners, for all plates.

## **2.9 PROTECTIVE PLATES**

N/A

## **2.10 THRESHOLDS**

##### **Characteristics:**

- a. All thresholds shall be certified by an independent testing laboratory to meet the requirements of ANSI/ BHMA A156.21.
- b. All thresholds shall be in accordance with the requirements of A.D.A.A.G. and ICC/ ANSI A117.1.
- c. Thresholds shall be furnished in an aluminum extrusion that is of alloy 6063 hardness T-5.
- d. Provide thresholds with 1/4-20 Stainless Steel Machine Screws and Lead Anchors.

## **2.11 DOOR STOP**

##### **Characteristics:**

- a. Tested to be in accordance with ANSI/ BHMA A156.16, Grade 1.
- b. Wall Bumpers shall have a solid forged brass housing with a concealed, in the convex bumper, attachment. Provide with wood screw and plastic anchors.
- c. Floor Stops shall be made from solid cast brass or bronze. Provide with machine screws and lead expansion shieldanchors.
- d. Install floor stops in such a position that they permit maximum door swing, but do not present a hazard orobstruction.

## **2.12 SILENCERS**

Provide GJ-64 silencers for all hollow metal frames. Single doors shall have three (3) silencers. Double doors shall have two (2) silencers.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

**INSTALLATION:** Work shall be done by a craftsman skilled and experienced in installation of finish hardware. Mortised items shall be neatly set in and made flush with door or frame surface. Manufacturer's instructions and recommendations shall be strictly followed.

**FASTENERS:** Hinges, pivots, locks, and exit devices shall be installed with proper sex bolts, wood or machine screws as supplied by the manufacturer. Surface closers shall be mounted to door with sex bolts. Door pulls shall be installed on doors with thru-bolts as supplied by manufacturer.

### **3.2 ADJUSTING, CLEANING, AND DEMONSTRATING**

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
  - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy to execute final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.

### 3.3 HARDWARE SETS

#### Hardware Set 1      Tag# 1

1 ea	Cont Hinge	112 HD	83"
1 ea	Rim Exit	DL-CD24R-	NL-OP
1 ea	Mortise Cylinder	C987	
1 ea	Rim Cylinder	C953	
1 ea	Offset Pull	8190-0	
1 ea	Parallel Arm Closer	1461	H-Cush-18PA-30-60

**NOTE:** Threshold and Weather Strip by Aluminum Door Supplier

#### Hardware Set 2      Tag# 2, 7, 9, 10

3 ea	Ball Bearing Hinges	5BB1	4½ x 4½ NRP	630
1 ea	Rim Exit	25R-	NL	
1 ea	Mortise Cylinder	C987		
1 ea	Closer	1461	Rw/PA	
1 ea	Saddle Threshold	412S		
1 ea	Door Sweep	759S-V		
1 roll	Weather Strip	736S		
1 ea	Drip Cap	8IOS	6"WTDW	

# End of Schedule

## **SECTION 08800 - GLASS AND GLAZING**

### **PART 1 - SCOPE**

- A. This Section includes all labor, materials, equipment and related items required for the work of glass and glazing as shown on the Drawings and specified herein.

### **PART 2 - SUBMITTALS**

- A. The Contractor shall submit to the Architect for approval prior to furnishing materials at the job site, in five (5) copies, manufacturer's specifications, application and performance data, etc. for all glass and glazing materials, except miscellaneous accessories specified hereunder.
- B. Samples. The Contractor shall submit if requested to the Architect for approval prior to furnishing materials at the job site, duplicate samples of the following:
  - 1. Glass of each type, not less than 3" x 5".
  - 2. Glazing compound, one (1) cartridge.

### **PART 3 - CODES AND STANDARDS**

- A. All glazing compounds and methods of glazing shall be in accordance with applicable portions of the Flat Glass Marketing Association's "Glazing Manual", latest edition.
- B. All safety glazing shall meet requirements of the Kentucky Department of Housing, Buildings, and Construction and appropriate Kentucky Revised Statutes.

### **PART 4 - PRODUCT HANDLING**

- A. Glass shall be delivered to the job and shall be stored on end and under cover. Glass shall be properly crated, packaged, and protected from damage. Glazing compounds shall be delivered in manufacturer's sealed containers, with attached labels properly identifying the types.

### **PART 5 - MATERIALS**

- A. Insulating glass for installation in aluminum windows shall be of sizes shown, composed of outer and inner panes of 1/4" (for color, see elevations) / 1/4" clear .548, 1" O.A. , by LOF separated by a 1/2" dehydrated air space. Each unit shall be hermetically sealed and glass shall be separated by a spacer around the edges as standard with the manufacturer.
  - 1. Warranty. Each unit shall be guaranteed by the manufacturer not to develop, under normal conditions, material obstruction of vision as a result of film formation on the internal glass surfaces caused by failure of the hermetic seal other than through glass breakage for a period of ten (10) years.

- B. Compound for glazing in openings other than those which are dry-glazed shall be non-staining, one-part polysulfide base sealant, and shall be PRC "Rubber Caulk 5000", Pecora "Synthacalk GC-9", or DAP "Flexiseal". Color of compound shall be manufacturer's standard as selected by the Architect.
- C. Miscellaneous Items. Provide neoprene spacers, setting blocks, clips, and all accessories required for the work of glazing.
- D. Other material shall be as specified hereinafter.

## **PART 6 - GLAZING**

- A. General Requirements:
  - 1. Glazing shall be done in a weathertight and waterproof manner. No glazing work shall be done when the temperature is below 40 degree F.
  - 2. Glazing surfaces shall be extremely clean, dry and completely dust free before commencing application of glazing materials.
  - 3. Remove glazing beads completely, perform glazing operations and set back in correct location. Do not mar beads, screws and the like.
  - 4. Glazing shall be done at the building after windows, frames, doors, etc. are installed.
  - 5. Remove excess glazing compound from glass and other adjacent surfaces to prevent permanent stains or other damage.
- B. Aluminum entrance doors and fixed window frames shall be glazed in strict accordance with entrance manufacturer's instructions and details for these operations.

## **PART 7 - CLEANING**

- A. At completion, remove dirt, stains, etc. from glass. Wash and polish glass inside and outside surfaces. Exercise care so as not scratch or damage glass. Do not use acid solution or water containing caustic soaps. Leave work in perfect condition as approved by the Architect.

End of Section



## SECTION 09900 - PAINTING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION OF WORK

- A. Extent of painting work is shown on drawings and schedules, and as herein specified.
- B. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated.
  - 1. Surface preparation, priming, and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- C. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.
- D. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors as designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.
- E. Do not paint over any code-required labels such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

#### 1.2 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer on published product data pages, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used. Test existing surfaces scheduled to receive new paint or epoxy coating to insure compatibility of new primer and paint system.
- C. Employ only experienced and competent mechanics.
- D. Field Quality Control: Prepare and finish a sample area or room as directed. Finish in accordance with specification requirements for Architect's approval of materials, color and workmanship. Approved area or room shall serve as Project Standard.

### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.
- B. Provide Owner at completion of job, one gallon of paint of each color selected. Provide original unopened labeled containers with color sample and list of room numbers where used.

### 1.4 DELIVERY AND STORAGE

- A. Deliver materials to job site in original, new, and unopened packages and containers bearing manufacturer's name and label, and following information:
  - 1. Name or title of material.
  - 2. Federal Specification number, if applicable.
  - 3. Manufacturer's stock number and date of manufacturer.
  - 4. Manufacturer's name.
  - 5. Contents by volume, for major pigment and vehicle constituents.
  - 6. Thinning instructions.
  - 7. Application instructions.
  - 8. Color name and number.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.
  - 1. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of paints.

### 1.5 JOB CONDITIONS

- A. Coordinate with other trades to insure adequate ventilation and dust-free environment during application and drying of paint.
- B. Maintain temperature and humidity within Manufacturer's recommended tolerances.
- C. Do not apply paint in snow, rain, fog, or mist; or when humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.
  - 1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
- D. Painting Contractor shall provide stand mounted, high intensity, portable lighting for their use during painting to provide adequate illumination.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Manufacturer: Subject to compliance with requirements, provide paint products of one of the following:
  - 1. The Sherwin-Williams Company
  - 2. PPG
  - 3. Benjamin Moore
  - 4. Porter Paints
  - 5. Calhoun Farrell

### **2.2 MATERIALS**

- A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
  - 1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

### **3.2 SURFACE PREPARATION**

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
  - 1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
  - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease in accordance with SSPC SP-1, prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- B. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, to be painted by removing efflorescence, chalk, dust, dirt, grease, oils in accordance with ASTM D 4258/D 4259/D 4261 (CMV).
  1. Determine alkalinity and moisture content of surfaces to be painted by performing ASTM D 4262. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
- C. Ferrous Metals: Clean ferrous surfaces which are not galvanized or shop-coated of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning in accordance with SSPC SP-1.
  1. Touch up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications.
    - a. Clean and touch-up with same type shop primer.
- D. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent such as Great Lakes Laboratories "Clean N' Etch".

### 3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

### 3.4 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
  - 1. Paint colors, surface treatments, and finishes are indicated in "Schedules" of the Contract Documents.
  - 2. Provide finish coats which are compatible with prime paints used.
  - 3. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. Dry film thickness will be measured according to SSPC PA-2.
  - 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
  - 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat non-specular black paint such as Sherwin-Williams: PM 400 Black, B30 or B400.
  - 6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
  - 7. Finish exterior doors on tops, bottoms, and side edges same as exterior faces unless otherwise indicated.
  - 8. Sand lightly between each succeeding enamel or varnish coat.
  - 9. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted unless otherwise indicated.
- B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  - 1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer. Dry film thickness will be measured according to SSPC PA-2.
- D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces, and exposed exterior work that is not factory finish painted.
- E. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
  - 1. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- G. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
  - 1. Provide satin finish for final coats unless otherwise indicated.
- H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

### 3.5 CLEAN-UP AND PROTECTION

- A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans, and rags at end of each work day.
  - 1. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
  - 1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

2. At the completion of work of other trades, touch up and restore all damaged or defaced painted surfaces.

### 3.6 ADJUST AND CLEAN

- A. Clean surfaces of spills, splatters, drips and stains from painting application.
- B. Replace and adjust finish hardware, accessories, fixtures and similar items removed from work.
- C. Touch-up damaged paint surface prior to acceptance of building by the Owner. Mix or thin touch-up paint as recommended by the Manufacturer and blend into existing paint.

### 3.7 PAINT SYSTEMS

- A. Paints listed are those of Sherwin-Williams unless noted otherwise.  
Painting subcontractor wishing to use other products must submit their “or equal” for review during the bidding process. Please note that *colors have been selected*.
- B. Exterior Coating Systems:
  1. Ferrous Metals  
Primer: Sherwin-Williams Industrial Enamel, B66W310 @ 2-2.5 mils dft  
1<sup>st</sup> Coat: Sherwin-Williams Industrial Enamel, B66W310 @ 2-2.5 mils dft  
2<sup>nd</sup> Coat: Sherwin-Williams Industrial Enamel B54W00101 @ 2.0-2.5 mils dft per coat  
3<sup>rd</sup> Coat: Sherwin-Williams Industrial Enamel B54W00101 @ 2.0-2.5 mils dft per coat
    - a. Typical Applications: Overhead doors and frames, steel doors and frames, piping, pipe railing, miscellaneous metals.
  2. Zinc Coated Metals  
Primer: Sherwin-Williams Pro Industrial ProCryl Universal Primer B66W310 @ 2.0-2.5 mils dft  
1<sup>st</sup> Coat: Sherwin-Williams Pro Industrial ProCryl Universal Primer B54W00101 @ 2.0-2.5 mils dft  
2<sup>nd</sup> Coat: Sherwin-Williams Pro Industrial ProCryl Universal Primer B54W00101 @ 2.0-2.5 mils dft
  3. Concrete Block  
Provide clean and dulled surface for application of new paint as recommended by paint manufacturer.  
1<sup>st</sup> Coat: Sherwin-Williams Heavy Duty Block filler B42W46 (White) @ 7.0-14.5 mils dft  
2<sup>nd</sup> Coat: HC Colortop water based concrete stain (White) @ 1.5-2.0 mils dft  
3<sup>rd</sup> Coat: HC Colortop water based concrete stain (White) @ 1.5-2.0 mils dft

7. Exposed Structural Steel: 2 coats of a semi-gloss waterborne dryfall

- 1<sup>st</sup> Coat: S-W Pro Industrial DTM Primer-Finish, B66W0001 @ 2.2-3.5 mils dft
- 2<sup>nd</sup> Coat: S-W Pro Industrial Waterborne Dryfall, B42W00083 @ 2.3-3.5 mils dft
- 3<sup>rd</sup> Coat: S-W Pro Industrial Waterborne Dryfall, B42W00083 @ 2.3-3.5 mils dft

END OF SECTION



## **SECTION 13121 - PRE-ENGINEERED BUILDINGS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Structural steel frame.
- B. Complete roof covering system consisting of the exterior roof panels, panel attachments, sealants, mastics, trim and flashings as required.
- C. Complete wall covering system consisting of the exterior wall panels, panel attachments, sealants, mastics, trim and flashings as required for a weathertight assembly.
- D. Field seaming machine.

#### **1.02 RELATED SECTIONS**

- A. Section 03300 - Cast-in-Place Concrete: Foundations and anchor bolts.
- B. Section 09900 - Paints and Coatings: Finish painting of structural members, doors, roof curbs, etc.

#### **1.03 REFERENCES**

- A. AAMA 101 - Voluntary Specification for Aluminum and Poly (Vinyl Chloride) (PVC) Prime Windows and Glass Doors; American Architectural Manufacturers Association.
- B. ASTM A 36/ASTM A36M - Standard Specification for Carbon Structural Steel.
- C. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- D. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- E. ASTM A 529/A 529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
- F. ASTM A 570/A 570M - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
- G. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steel.
- H. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

- I. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- J. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
- K. ASTM D 1929 - Standard Test Method for Ignition Properties of Plastics.
- L. ASTM D 2843 - Standard Test Method for Smoke from the Burning or Decomposition of Plastics.
- M. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- N. ASTM E 774 - Standard Specification for Sealed Insulating Glass Units.
- O. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames; Steel Door Institute.
- P. UL 580 - Tests For Wind Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.

#### 1.04 DEFINITIONS

- A. Building Width: Measured from outside to outside of sidewall girts.
- B. Building Length: Measured from outside to outside of endwall girts.
- C. Building Line: Outside face of horizontal steel girt.
- D. Building Eave Height: Measured from the intersection of the top of the roof framing and the outside of the wall framing to the bottom of the sidewall column base plate.
- E. Bay Spacing: Measured from centerline to centerline of primary frames for interior bays and from centerline of the first interior frame to outside of endwall girts for endbays.
- F. Roof Pitch: The ratio of the vertical rise to the horizontal run.

#### 1.05 MANUFACTURERS

- A. Varco Pruden
- B. American Buildings Company
- C. A & S Building Systems, Inc.
- D. Approved equals.

#### 1.06 DESIGN REQUIREMENTS

- A. Design structural systems according to professionally recognized methods and

- standards and legally adopted building codes.
- B. Design under supervision of professional engineer licensed in Kentucky.
  - C. Manufacturer must be certified by AISC in the Metal Building category.
  - D. Supplier must be a primary manufacturer of frames, secondary steel, roof and wall sheeting and trim.
  - E. Design Loads: See Structural Sheet for additional design load criteria information
    - 1. Applicable Building Code: KBC latest edition.
    - 2. Roof Live Load: 20 psf, non-reducible.
    - 3. Roof Snow Load: 15 psf.
    - 4. Ground Snow Load: 20 psf.
    - 5. Roof Wind Load: Calculate in accordance with applicable code, using 80 mph. Basic Wind Speed, Exposure Category C.
    - 6. Collateral Loads: 8 psf.
      - a. Seismic Loads: Calculate and apply seismic loads in accordance with the requirements of applicable building code based on the following project specific values as applicable:
        - 1. Seismic Zone: 1
    - 7. Dead loads, including the weight of all indicated permanent construction.
  - F. Design wall and roof panel system including secondary members to withstand specified loads with deflection of  $L/240$  of span, maximum.
  - G. Anchor Bolts: Furnish design criteria for anchor bolts furnished by others, to resist the loads induced by the design loads on the structure.

#### 1.07 SUBMITTALS

- A. Design Data: Provide detailed design criteria and calculations.
- B. Certification: Manufacturer certification that the building conforms to the contract documents and manufacturer's standard design procedures.
- C. Shop Drawings: Show building layout, primary and secondary framing member sizes and locations, cross-sections, and product and connection details.
- D. Product Data: Information on manufactured products to be incorporated into the project.
- E. Color Charts: For selection of colors.
- F. Anchor Bolt Installation Drawings: Layouts with bolt diameters.
- G. Specimen Warranty.

#### 1.08 WARRANTY

- A. Provide manufacturer's standard warranty for:  
Materials and workmanship: 1 year.
  - 1. Panel finish: 20 years.
  - 2. Weathertightness: 20 years.

## **PART 2 - PRODUCTS**

### **2.01 METAL MATERIALS**

- A. Select materials and material yield strengths based on building design requirements; use the following unless required otherwise.
- B. Structural Steel Plate, Bar, Sheet, and Strip for Use in Bolted and Welded Constructions: ASTM A 572/A 572M/A570, A 529/A 529M or A 36, with minimum yield strength of 50,000 psi (345 Mpa).
- C. Structural Steel Material for Use in Roll Formed or Press Broken Secondary Structural Members: ASTM A 570/A 570M, or A607 with minimum yield strength of 55,000 psi (380 Mpa).
- D. Galvanized Steel Sheet for Roll Formed or Press Broken Roof and Wall Coverings, Trim and Flashing: ASTM A 653/A 653M, with minimum yield strength of 50,000 psi (345 Mpa).
- E. Roof. Galvalume Steel Sheet Used in Roll Formed or Press Broken Roof Covering: Aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, with minimum yield strength of 50,000 psi (345 MPa); nominal coating weight of 0.5 oz per sq. ft (152 kg/sq m) both sides, equivalent to an approximate coating thickness of 0.0018 inch (0.05 mm) both sides.
- F. Hot Rolled Steel Shapes: W, M and S shapes, angles, rods, channels and other shapes; ASTM A 572/A 572M or ASTM A 36/A 36M as applicable; with minimum yield strengths required for the design.
- G. Structural Bolts and Nuts Used with Primary Framing: High strength, ASTM A 325.
- H. Bolts and Nuts Used with Secondary Framing Members: ASTM A 307.
- I. Shop Coat: Manufacturer's standard rust inhibitive primer paint; color, gray.
- J. Walls. SP Pre-Painted Finish: 0.8 mil baked on silicone polyester exterior surface.
  - 1. Color: As selected from manufacturer's full line.

### **2.02 FRAMING COMPONENTS**

- A. Primary Framing: Rigid Frame (RF Series) solid web framing consisting of tapered rafters rigidly connected to tapered columns. Provide a clear span that supports the loads at bay spacings indicated.
- B. Structure: Work shall include the following:
  - 1. The main building 300' x 350', 105,000 sq.ft., structure will be a modular series with a multi-span/rigid frame tapered exterior columns and interior columns. Column frame (bay) spacing shall be 50'. Interior column spacing shall be 75'.
  - 2. Eave height at side walls shall be 30'.
  - 3. Roof slope 1" per foot.
- C. Front office Entry. See structural sheets.
- D. Endwall Framing: Corner posts, endposts and rake beams.
- E. Transbay Members: Open web, parallel chord, secondary joists; simple span, utilizing materials, sizes and yield strength as required.
- F. Girts: Zee- or Cee-shaped; depth as required, with minimum yield strength of 55,000 psi (345 MPa); simple span or continuous span as required for design.
- G. Wind Bracing: Diagonal bracing in accordance with manufacturer's standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design.
- H. Primary Frame Flange Bracing: Attached from girts to the primary framing, minimum yield strength as required for design.
- I. Base Angles: 2 inch x 3 inch x 0.059 inch (50 mm x 75 mm x 1.5 mm) steel angles, with minimum yield strength of 55,000 psi (38 Mpa), anchored to the floor slab or grade beam with power driven fasteners or equivalent at a maximum spacing of 2 feet (1220 mm) on center and not more than 6 inches (150 mm) from the end of any angle member.
- J. Door Headers and Jambs: Zee- or Cee-shaped; depth as required; with minimum yield strength of 55,000 psi (380 Mpa).
- K. Sag Angles and Bridging: Steel angles, with minimum yield strength of 36,000 psi (250 Mpa).
- L. Fabrication: Fabricate according to manufacturer's standard practice.
  - 1. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.

2. All welding operators and processes shall be qualified in accordance with the American Welding Society “Structural Welding Code”, AWS D1.1.
  3. Field connections. Prepare members for bolted field connections by making punched, drilled, or reamed holes in the shop.
- M. Component Identification: Mark all fabricated parts, either individually or by lot or group, using an identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.
- N. Shop Coating: Finish all structural steel members using one coat of manufacturer’s standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.
- O. Package building components for shipping by common carrier.

## 2.03 ROOF AND WALL PANEL COMPONENTS

- A. Roof Panels: SSR Standing Seam Roof Panels; 24 inches (610 mm) wide net coverage, with 3 inches (75 mm) high major ribs formed at the panel side laps, formed for field seaming using electrically operated seaming machine.
1. Side Joints: Factory applied sealant for field seaming.
  2. Material: Galvalume steel (finish only), Main Building; Front Office, KXL finish.
  3. Thickness: 24 gage (0.61 mm).
  4. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, mechanically field-seamed into place to form a double-fold 360-degree seam.
  5. Length: Continuous from eave to ridge up to 41 feet (12.5 m) in length.
  6. Endlaps, Where Required: 7 inches (178 mm) wide, located at a support member.
  7. Panel-to-roof purlin structural attachments: SSR clips with movable tabs which interlock with seamed SSR panel ribs and provide for 1-1/2 inch (37 mm) of panel movement in either direction from center of clip to compensate for thermal effects.
  8. The SSR Roof System shall be tested and certified by Factory Mutual to meet the following tests:
    - a. FM 1-60  
The design of the SSR Roof for this project shall meet FM 1-60 Factory Mutual design.
  9. The SSR Roof System shall be tested and certified to meet Underwriters Laboratory UL 90 wind uplift rating. The UL 90 is a requirement for this project.
  10. Panels shall have been tested in accordance to ASTM E-1592.
  11. Panel fastening to meet uplift requirements shall be based on tested fastener values with appropriate Safety Factors.
  12. Purlin strength with the SSR roof panel shall be determined and tested in accordance with AISI procedures.
- B. Ridge Assembly for High End of Slopes: SSR Ridge; draw-formed aluminum seam caps factory-attached to SSR ridge panels that are mechanically field-seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement.

- C. Wall Panels: Vee Rib; 36 inch wide net coverage, with reverse ribs 12 inches on center 1¼" deep, sculptured profile with textured embossed finish.
1. Material: Galvanized steel, with G90/Z275 coating.
  2. Thickness: 24 gage.
  3. Side laps: At least one full major rib, with a supporting member bearing edge on the lower panel and an anti-capillary groove on the upper panel.
  4. Length: Continuous from sill to eave up to 41 feet in length.
  5. Endlaps, Where Required: Located at a support member.
  6. Cut panels square at ends; provide base trim at sill.
  7. Finish: KXL pre-painted finish.
- D. Panel Fasteners:
1. For Galvalume and KXL finished roof panels: Stainless steel-capped carbon steel fasteners with integral sealing washer.
  2. For wall panels: Coated carbon steel.
  3. Color of exposed fastener heads to match the wall panel finish.
  4. Concealed Fasteners: Self-drilling type, of size as required.
  5. Provide fasteners in quantities and location as required by the manufacturer.
- E. Flashing and Trim: Match material and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.
- F. Plastic Parts: Glass fiber reinforced resin or thermoformed ABS (Acrylonitrile-Butidene-Styrene).
1. ABS: Minimum 1/8 inch (3 mm) thick.
  2. Color: Manufacturer's standard color.
- G. Sealants, Mastics and Closures: Manufacturer's standard type.
1. Provide at roof panel endlaps, sidelaps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; use tape mastic or gunnable sealant at sidelaps and endlaps.
  2. Provide at wall panel rakes, eaves, transitions and accessories.
  3. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.
  4. Tape Mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.
  5. Gunnable Sealant: Non-skinning synthetic elastomer based material; gray or bronze.
- H. Blanket Insulation: Glass fiber, with factory laminated facing material
1. Glass fiber: Odorless, neutral colored, long filament, flexible resilient, produced in compliance with the NAIMA 202 specifications.
  2. Thermal Resistance: to meet R-13 at walls and R-19 at roof @ 75°F mean

temperature.

3. Flame spread Index: 25 or less, when tested in accordance with UL 723.
  4. Smoke Developed Index: 50 or less, when tested in accordance with UL 723.
  5. UL Classified.
  6. Facing: White polypropylene scrim kraft; 0.0015 inch (0.04 mm) thick polypropylene film, glass fiber scrim reinforcing, 11 lb. kraft paper; permeance 0.09 perms (1.1 ng/Pa s sq m). Composite fiberglass and facing to meet Flame Spread of 25 or less, Smoke Developed of 50 or less, when tested in accordance with UL 723.
  7. Provide facing 3 inches (75 mm) wider on both edges than blanket.
  8. Width: As required for installation.
  9. Use blanket insulation at roof and walls.
- I. Thermal Blocks: High density, 3/4 inch (19 mm) thick extruded polystyrene, for installation over the purlin.

## 2.04 ROOF ACCESSORIES

- A. Eave Gutters: Roll-formed 26 gage (0.45 mm) steel sheet, with gutter straps, fasteners and joint sealant; manufacturer's standard bronze color.
1. Downspouts: 4 x 5 inches (100 by 125 mm) in 10 foot (3050 mm) lengths, with downspout elbows and downspout straps; same color as wall panels.
- B. Multi-Gutters and Valley Gutters: 0.059 inch (1.5 mm) thick cold-formed steel sheet.
1. Finish: G90/Z275 galvanized coated.
  2. Joints: Field welded or mechanically fastened.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that foundations are installed correctly.
- B. Verify that anchor bolts are installed as indicated on anchor bolt shop drawings.

### 3.02 ERECTION

- A. Erect pre-engineered building in accordance manufacturer's instructions, erection drawings, and other erection documents.
- B. Provide temporary bracing, shoring, blocking, bridging and securing of components as required during the erection process.

END OF SECTION



## **SECTION 15050 - GENERAL PROVISIONS AND REQUIREMENTS**

### **PART 1 - PERMITS, CODES, INSPECTIONS AND APPROVALS**

#### **1.1      Permits**

- A. All permits necessary for the completion ventilation system shall be obtained by the Contractor from the authorities governing such work. The cost of all permits shall be borne by the Contractor.

#### **1.2      Mechanical Work**

- A. Ventilation work shall be performed in accordance with the rules and regulations of the Kentucky Building Code, National Fire Protection Association, the latest standards recognized by the American Society of Heating and Air Conditioning Engineers and International Mechanical Code as adopted by the Commonwealth of Ky. All HVAC work shall be performed by a Licensed Kentucky Master HVAC Contractor.
- B. Where the scope of mechanical work includes electrical work, all provisions included in the electrical sections of the work shall apply.

#### **1.3      Inspection Requirements**

- A. The inspection work shall be scheduled for rough as well as the finished work. The rough inspection shall be divided into as many inspections as may become necessary to cover all roughing-in. A punch list inspection shall be scheduled with the Architect or his representative present.

### **PART 2 - MECHANICAL DRAWINGS AND SPECIFICATIONS**

- 2.1 The drawings and specifications are intended to cover all work enumerated under the respective headings. The drawings are diagrammatic only as far as final location of pipes, relative size, is concerned. Any item of work not clearly included, specified and/or shown, any errors or conflict between plans (Mechanical, Architectural, Structural or Electrical), specifications, codes and field conditions, shall be clarified by a written request to the Architect by the Bidder before bidding; otherwise the bidder shall, at his own expense, supply the proper labor and materials to make good any damages or defects in his work caused by such error, omission or conflict.
- 2.2 This Contractor shall be responsible for all revisions, modifications or changes necessary in the structural or architectural or electrical systems to accommodate the equipment to be furnished under this Section of the Specifications. This shall be made at no additional cost to the Owner.
- 2.3 Scale of Drawings and/or details shall be verified by the contractor in all areas where his work and/or expense is involved. This may involve all contract drawings: Architectural, Structural, Mechanical, Electrical, etc. due to the advent of computers, copiers, and faxes, which change drawing scales so easily, this is very important. If drawings are scaled to

determine quantities of materials, labor, etc., no allowances will be due the contractor due to inaccurate scales shown on any of the contract drawings or reproductions thereof.

### **PART 3 - SHOP DRAWINGS**

- 3.1 Submit shop drawings on all equipment to be furnished under this Division of the Specifications, in accordance with the General and Special Conditions.
- 3.2 Shop Drawings shall be submitted only after the Contractor has checked and verified all field measurements, quantities, equipment dimensions, specified performance criteria, installation requirements, electrical requirements, materials, catalog numbers, and similar data with respect thereto and reviewed or coordinated each shop drawing with the requirements of the work and the Contract Documents.
- 3.3 The shop drawings shall have a stamp or specific written indication that the Contractor has satisfied the requirements stated hereinbefore. Shop drawings submitted without the Contractor's review and stamp shall be immediately returned to the Contractor without the Architect's review.

### **PART 4 - CUTTING AND PATCHING**

- 4.1 The Contractor shall be responsible for locating all openings and chases he may require in floors, walls or ceilings of any type construction (whether under construction or existing).
- 4.2 Sleeves or openings shall be left in all new construction for passage of pipes and ducts. Where openings or sleeves have been omitted, they shall be drilled or sawed as required by the Architect. In existing construction, holes in poured concrete shall be core drilled.
- 4.3 All cutting and patching shall be done by the trades whose work is affected. All expenses incurred shall be the Contractor's responsibility.

### **PART 5 - WELDING**

- 5.1 Each manufacturer or Contractor shall be responsible for the quality of welding done by his organization and shall repair or replace any work not in accordance with these specifications.
- 5.2 If there is any doubt whatsoever regarding the quality of welds performed by any workmen, segments shall be cut from piping, selected by the Architect, and tested accordingly, all at the Contractor's expense. If weld fails to meet Owner's requirements, subject workmen shall be barred from any further welding.

### **PART 6 - TESTING AND ADJUSTING OF EQUIPMENT, ETC.**

- 6.1 When the work included is complete, the Contractor shall start up and adjust all parts of his system. All equipment items of the various systems shall be adjusted for proper operation within the framework of design intent, and the operation characteristics as published by the equipment manufacturer.
- 6.2 No equipment shall be operated for any purpose until properly lubricated and brought into service condition.

- 6.3 The Contractor shall provide all equipment, materials and labor required to make the necessary adjustments and all the necessary test equipment.
- 6.4 For starting up and adjusting which is not within the normal function or capacity of the Contractor's personnel, arrange and pay for the services of employees of the manufacturers of the various major items of equipment to supervise such adjustment and initial operation. If the Contractor elects to provide such service for any equipment with his personnel and this proves unsatisfactory in the opinion of the Architect, the Contractor must, upon notification of such dissatisfaction, arrange immediately for services of manufacturer's employees as specified above.
- 6.5 If it becomes necessary for temporary use of the system before all parts are complete, the Contractor shall test and adjust all parts as far as possible in order to make temporary use as effective as possible.
- 6.6 Upon completion of the installation, the Contractor shall, at his own expense, conduct complete performance tests in the presence of the Architect to fully demonstrate the capacity and all other characteristics of the systems. The test shall be run for a length of time sufficient (in the opinion of the Architect) to demonstrate fully the ability of each system to perform as required by design Drawings and Specifications. In the event the tests demonstrate any system performance is deficient, with all system components properly adjusted and balanced, the Architect may require additional tests of system components as may be required for final acceptance.
- 6.7 When a test is to be made, notify the Architect or his representative not less than 48 hours before the test is scheduled to start, who may witness the test, or any part of it. The Architect or his representative will have the right to defer the start of any test by not more than two (2) work days if the proposed date conflicts with other commitments of the personnel assigned to witness the tests.
- 6.8 Disconnect devices, equipment and attached piping which are not designed for the test pressure, and all existing piping systems, and install plugs and blind flanges to close openings.
- 6.9 Replace work found defective, or repair as directed. After replacement or repair, test work again as specified. Repeat until satisfactory.

## **PART 7 - EQUIPMENT SUPPORTS AND ROOF FRAMING**

- 7.1 All equipment shall be adequately supported from the building structure as applicable and shall be subject to the approval of the Architect or his representative.
- 7.2 The Contractor shall provide all loose angles, structural steel, hanger rods, vibration isolators, support bases, etc. as required in order to support all equipment furnished under this contract.
- 7.3 All equipment shall be installed level and, where cooling coil drain pans are involved, high enough to install an insulated trapped drain line.
- 7.4 In all cases the manufacturers installation instructions shall be adhered to as minimum requirements.

## **PART 8 - OPERATING AND MAINTENANCE INSTRUCTIONS**

- 8.1 Deliver to the Architect, three (3) copies of the complete Operating and Maintenance Instructions for the equipment furnished and installed under this Contract, two (2) of which copies shall be for delivery to the Owner. Provide the aforementioned parties with parts lists for all new major equipment items. Each set shall be provided in a plastic or hard back binder with notations of contents.
- 8.2 Furnish the services of a fully competent operational instructor as directed by the Architect, to instruct operating personnel in the operations and care of all equipment and systems (including control systems) and their various components.

## **PART 9 - GUARANTEE**

- 9.1 Guarantee
  - A. The Contractor shall be responsible for guaranteeing all work, including equipment, materials and workmanship furnished under this Division of the Specifications. This guarantee shall be against all defects of any of the above and shall run a minimum period of one (1) year from the date of acceptance of the work as evidenced by final payment. Any defective work, equipment, materials and/or workmanship that develops within the guarantee period, which is not caused by ordinary wear, damage or abuse by others, shall be replaced and/or corrected without additional cost to the Owner.

END OF SECTION

## **SECTION 15250 - SCOPE OF WORK**

### **PART 1 – WORK INCLUDED**

- 1.1 The work covered by this Section of the Specifications consists in furnishing all plant, labor, equipment, appliances, and materials and in performing all operations in connection with the installation of mechanical systems (plumbing, heating, air conditioning, ventilating and sprinklers) complete in strict accordance with this Section of the Specifications and the applicable Drawings and subject to the terms and conditions of the Contract. The entire installation shall be in accordance with all existing laws, rules and regulations, both State and local.
- 1.2 Work Included (Ventilation)
  - A. Ventilation and general exhaust complete with all hangers, supports, diffusers, registers, grilles, louvers, dampers and access doors.
  - B. All equipment required, including fans, blowers, motors and drives, guards, vibration eliminators, flexible connections, filters, coils, refrigeration equipment, etc.
  - C. A complete system of controls, all as required and/or shown on the Drawings.
  - D. All miscellaneous items as required for a complete project.

END OF SECTION

## **SECTION 15600 - MECHANICAL EQUIPMENT**

### **PART 1 - PROPELLER WALL FANS**

- 1.1 Furnish and install where shown on the drawings. Fans shall be belt driven, with adjustable pitch motor sheave. Fans shall be steel panel mounted with discharge venturi.
- 1.2 Fans shall be installed in a wall box with gravity weatherproof damper with inlet screen and rain hood. Finish shall be baked enamel, color selected by Architect.

### **PART 2 - LOUVERS & DAMPERS COMBINED (WAREHOUSE)**

- 2.1 Furnish and install where shown on the drawings at two locations.
- 2.2 Louvers shall be extruded aluminum construction, blades and frames, 12 gage with built-in dampers. Dampers shall be gasketed for minimum leakage and shall be constructed of galvanized steel. Provide for each unit a Belimo damper operator, 120V/1 $\phi$ .
- 2.3 Louvers shall have 1¼ flange on all four (4) sides and shall be caulked weatherproof. Provide aluminum birdscreen. Provide sheet metal frame for louvers to cover concrete block opening. Holes in concrete block wall shall be coordinated with general contractor.

END OF SECTION

## **SECTION 16000 - GENERAL PROVISIONS AND REQUIREMENTS**

### **PART 1 - PERMITS, CODES, INSPECTIONS, APPROVALS, ETC.**

- 1.1 The Contractor shall obtain all permits necessary and shall bear all costs involved.
- 1.2 All electrical work shall be performed in accordance with the requirements of the latest revision of the National Electrical Code (NFPA 70), National Electrical Safety Code, and Ky. Building Code. Similarly, all electrical equipment, where applicable, shall conform to all other NFPA Pamphlets, NEMA, ANSI, IPCBA and U.L. requirements. Whenever and wherever the design or State and local regulations require higher standards than the current National Electrical Code, then these shall be followed. Division 1 of the Architectural specifications shall apply to all electrical work.
- 1.3 The Architect/Engineer shall be notified twenty-four (24) hours in advance when any tests are to be made and before any work is concealed. The Contractor shall notify the Architect/Engineer when he is ready for final inspection.
- 1.4 The fronts of all electrical panels shall be removed for final punch list inspection.
- 1.5 All electrical items on this project shall bear the Underwriters Laboratories (UL) label and/or FM (Factory Mutual).
- 1.6 Provide electrical inspection by a licensed and recognized Electrical inspector. Notify Electrical Inspector in writing, immediately upon start of work with a copy of notice to Architect. Schedule inspection for rough as well as finished work. Approval from Electrical Inspector will not be allowed as reason for deviation from Contract Documents. All costs incidental to Electrical Inspection shall be borne by Contractor. Prior to final acceptance of work and release of final payment, deliver to Architect the certificate of final inspection.

### **PART 2 - CLEANING AND PAINTING**

- 2.1 The Contractor shall remove all temporary stickers, tags, etc. from all items installed under this Contract and shall thoroughly clean all equipment or materials installed under this Contract. Scratched and damaged paint and/or other finishes shall be touched up and/or repainted as required. All equipment shall be cleaned and made ready for painting by others.
- 2.2 Upon completion of the work, the Contractor shall thoroughly clean and lubricate all equipment.
- 2.3 Surplus material, rubbish and equipment resulting from the electrical work shall be removed from the building and premises by the Contractor upon completion of the work in accordance with the Architectural specifications.
- 2.4 All permanent nameplates on equipment shall be kept clean and exposed for easy reading. If field conditions warrant (in the opinion of the Architect) the Contractor shall vacuum clean all equipment and installed materials.

### **PART 3 - IDENTIFICATION OF ELECTRICAL EQUIPMENT**

- 3.1 The equipment services, feeder and branch circuits shall be marked in accordance with the National Electrical Code. Mark with moisture and fungus resistant wire markers and nameplates. All conductors that are not color coded shall be marked with colored tapes to denote phases.
- 3.2 Identification of main entrance panelboard, distribution panelboards and branch circuit panelboards shall be labeled with a machine cut lamacoid plate with ¼" high letters, indicating the panel designation, voltage and phase (i.e.: Panelboard "A" - 120/208V., 3-Phase, 4W). Branch panelboards in finished areas shall have plate installed inside of door.
- 3.3 All switches or breakers in main switchboard and distribution panels shall be labeled to indicate equipment served with ½" wide machine cut lamacoid plate with 1/8" high letters.
- 3.4 All remote disconnects, safety switches, motor starters, etc. shall have the name of the motor/equipment which it is controlling engraved on lamacoid plate, ½" wide with 1/8" high letters. Exact name of system or motor shall be coordinated with Architect/Engineer prior to manufacture.
- 3.5 All junction boxes, terminal boxes, etc. larger than 6" X 6" shall be marked with Dymo-Labeler, the service and/or number as shown on the Electrical Drawings. The identification numbers on all junction or terminal boxes in finished areas shall be inside face of cover or door.
- 3.6 Mark all conduit housing currents with greater than 300 volts phase to phase every 20'. ½" high letters to be used.
- 3.7 All lighting and power panels shall have each breaker (including spares and spaces) identified with typed directory cards covered in plastic, indicating type and location of load. Use actual door tags (not necessarily the names and numbers shown on plans).

#### **PART 4 - SLEEVES, ESCUTCHEONS AND INSERTS**

- 4.1 Sleeves shall be installed through masonry and concrete walls and floors for the passage of electrical raceways, cables, etc. Sleeves shall be placed and sized to permit installation and removal of the assembly. All electrical raceways larger than 1" shall be sleeved. Sleeves are not required where raceway bends into wall.
- 4.2 All raceways installed through firewalls must be sleeved and firestopped.
- 4.3 Cast iron sleeves shall be installed through all walls where conduit enters the building below grade. All other sleeves shall be standard weight steel. Sleeves shall be flush with each face of the wall. Sleeves for conduit through outside walls shall be packed with oakum for weatherproofing.
- 4.4 All sleeves through floors shall extend ¾" above finished floors. All sleeves shall be ½" larger than the outside diameter of the duct or conduit. All sleeves shall be equal to Schedule 20 pipe or heavier.
- 4.5 Escutcheon shall be installed around all openings in exposed finished area. This includes all raceways whether they are sleeved or not. Escutcheon shall be equal to Benton & Caldwell, No. 40.



- 4.6 Inserts shall be installed as required, with location coordinated with other Contractors.

## **PART 5 - CIRCUIT NUMBERS AND CIRCUITRY**

- 5.1 Circuit numbers, and breaker numbers shall be coordinated on panel identification card as shown on the Drawings.
- 5.2 The exact routing of circuits as shown on the drawings from receptacle to receptacle, light to light, etc. is schematic only. If the Contractor desires to change the routing of any circuits, he may do so within the scope of good engineering practice, and with the permission of the Architect/Engineer. All outlets shall be on the same circuit number as shown on the Drawings. Any change in routing shall be shown on the "Record" Drawings. Contractor shall not run more than (3) circuits (one circuit per phase) in any conduit even if conductors are derated (1 neutral per run of conduit).

## **PART 6 - PROTECTION**

- 6.1 All work, equipment and material shall be protected at all times. All conduit openings shall be closed with caps or plugs during construction. All equipment and accessories shall be tightly covered and protected against dirt, water or other injury during period of construction.
- 6.2 The Contractor shall cover all installed receptacles, switches, etc. with a plastic or equal cover prior to the painting of the areas. No device plate shall be installed prior to the finish painting. Any receptacle, switch, device plate, etc. with paint on it shall be removed and replaced by this Contractor. It shall be the Contractor's responsibility to coordinate with the Painting Contractor with regard to the scheduling of the installation of switches, outlets, device plates, etc.

## **PART 7 - TESTING AND ADJUSTING**

- 7.1 When the work included is complete, the Contractor shall start up and adjust all parts of his system. All equipment items of the various systems shall be adjusted for proper operation within the framework of design intent, and the operating characteristics as published by the equipment manufacturer.
- 7.2 No equipment shall be operated for any purpose until properly lubricated and brought into service condition.
- 7.3 The Contractor shall provide all equipment, materials and labor required to make the necessary tests.
- 7.4 The Architect/Engineer reserves the right to require the services of an authorized representative of the manufacturer in the event the Contractor is unable to so adjust any piece of equipment. The Contractor shall arrange for such services and bear all incurred costs thereof. After completion of adjustments, the Contractor shall advise the Architect/Engineer that the work is ready for the final acceptance test.
- 7.5 Upon completion of the installation, the Contractor, at his expense, shall conduct complete performance tests in the presence of the Architect/Engineer and Owner to fully demonstrate the capacity and all other characteristics of the systems. The test shall be run for a length of time sufficient to demonstrate the ability of each system to perform as required by design drawings and specifications.

- 7.6 The Electrical Contractor shall perform the following tests:
- A. All branch circuits of No. 8 wire and larger and main feeders shall be megged for ground and insulation resistance before connecting to equipment. (Megger to be 500 volts).
  - B. All motors larger than ½ HP shall be megged before conductors are connected thereto and again after they have gained running temperature.
  - C. A record of all megging shall be delivered to the Engineer before final acceptance. Architect/Engineer shall be notified in advance so that he may witness the test.

## **PART 8 - CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS**

- 8.1 The Architectural, Structural, Electrical, Plumbing, Heating, Ventilating and Air Conditioning Drawings and Specifications are complementary to one another.
- A. The Contractor shall rough-in for and furnish all labor and materials necessary to make final connections to all equipment furnished by the Owner or any other Contractor or Sub-Contractor which requires electrical connections, except heating controls which shall be by Control Contractor.
- 8.2 The Contractor making the required connections shall be responsible for any damages caused by erroneously connected equipment.

## **PART 9 - MOTORS AND APPARATUS BY OTHER TRADES**

- 9.1 The Contractor shall obtain from the other trades all necessary information regarding motors, controls, and wiring connections of apparatus furnished by these trades.
- 9.2 Furnish and install all necessary wiring and raceways required for satisfactory testing and operation of all controllers, starters, motors, control boards, alarm boards and related equipment, etc. The other trades supplying apparatus on which there are motors will supply and deliver to the Contractor at the sidewalk or building receiving quarters all control equipment specified under their section of the specifications for erection and connection of all such equipment in their designated places under this section of the specifications.
- 9.3 The Contractor shall carefully examine the Architectural, Structural, Plumbing, Heating, Ventilating and Air Conditioning Drawings and Specifications to determine the extent, type and locations of all wiring required and shall obtain from the respective Contractors the wiring diagrams and other necessary information to properly install his part of the work.
- 9.4 Motor sizes shown on the Drawings are nominal sizes with some variation anticipated in the final installations. Under this section of the specifications, the Contractor is to coordinate the work with all other trades by obtaining all final data from each supplier and install wiring, circuit and motor protection and equipment in accordance with the actual equipment nameplate data regardless of sizes, etc. shown on the drawings. Undersized wiring, conduit, disconnects, etc. connected to equipment shall be the responsibility of the Contractor. Coordinate with the Engineer on any differences found between drawings and actual load data.

## **PART 10 - ELIMINATION OF NOISE AND VIBRATION**

- 10.1 During the construction of this project, if any system or piece of equipment produces noise or vibration which, in the opinion of the Architect is objectionable to the Owner, the Contractor shall, at his own expense, make changes in equipment and do all work necessary to eliminate the objectionable noise or vibration.

## **PART 11 - GROUNDING OF SYSTEM**

- 11.1 All metallic conduit, supports, cabinets and equipment shall be grounded in accordance with the latest issue of the National Electrical Code and as shown on the Drawings.
- 11.2 The size of the grounding conductor for service equipment shall not be less than that given in Article 250 of the National Electrical Code or as shown on the Drawings.
- 11.3 Ground bus and non-current carrying metallic parts of all equipment and conduit shall be securely grounded by connection to common ground bus insofar as possible or as shown. Jumper all noise or vibration isolators to insure ground potential.
- 11.4 The above ground bus shall be sized as per code with all connections made with pressure connectors.
- 11.5 No ground wires smaller than No. 12 solid copper shall be used; all wires larger than No. 8 shall be bare copper, stranded cable. All flexible conduit shall have a green insulated jumper bonded at each end.
- 11.6 The main ground electrode shall be sized per NEC (or as shown on the drawings) copper conductor laid in bottom of footer trench. This electrode shall be as shown, but no less than 100' long and shall be thermal welded to building steel at each column it passes with both ends tied back to ground terminal in main gear. Ground resistance shall not exceed 5 ohm. (If ground electrode cannot be installed in bottom of footer trench, then the Contractor shall provide ground rods necessary, (minimum of six (6)), no less than 15' (center to center) to meet the ohmic value mentioned above).
- 11.7 The main water pipe shall be bonded to the service equipment enclosure, the grounded conductor at the service and the grounding electrode conductor in footer trench.
- 11.8 All connections to main ground conductors shall be thermal welded.
- 11.9 All raceways with ground lug bushings shall be grounded to their respective boxes with an approved jumper wire.
- 11.10 All EMT runs to receptacles, light fixtures, power outlets or any equipment shall have a code size insulated green ground wire connected to respective receptacle, light fixture outlet or equipment. All PVC (if allowed) shall have code sized ground wire.

## **PART 12 - SAMPLES**

- 12.1 There will be no samples required by the Architect under this section of the specifications, unless a substitution is questioned. Any samples submitted may be subsequently installed on the project providing it is approved.

## **PART 13 - SHOP DRAWINGS**

- 13.1 Submit Shop Drawings in bound sets on all items furnished under this Contract as indicated at the end of each specification section and in sufficient number to satisfy the Architect's requirements. Shop Drawings should be submitted within 30 days after the work order to proceed. All shop drawings submitted for review shall bear an "approved stamp" and signed by the Contractor. All shop drawings not bearing the Contractor's "approved" stamp will be returned without comment.

#### **PART 14 - MANUFACTURER'S SUBMITTALS**

- 14.1 Any manufacturer wishing to be listed by addendum as equal-to-bid must submit catalog cuts, brochures, samples, etc., and a letter requesting to be listed, (12) twelve working days prior to the bid date.
- 14.2 All submittals must include complete information on the item(s) in question, as well as on all related components and accessories. All information shall be clearly marked/highlighted to indicate the specific items to be provided.
- 14.3 Complete, un-marked manufacturer product-line catalogs are not acceptable.
- 14.4 Inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of the drawings and specifications.
- 14.5 Final acceptance will be subject to Engineers shop drawing review.
- 14.6 Refer to separate specification sections for additional, specific submittal requirements.

#### **PART 15 - CUTTING AND PATCHING**

- 15.1 Any cutting and patching in the building required to install the equipment, etc. shown on Drawings shall be accomplished by the Contractor. He shall meet all requirements of the Architectural Section and at his expense.
- 15.2 The Contractor shall be responsible for all openings and chases he may require in floors, walls or ceilings of any type construction (whether under construction or existing). All work necessary as a result of failure on the part of the Contractor to provide the required openings and chases and to set sleeves and inserts shall be performed at his own expense. When shown, these openings and/or chases will be formed or provided for in the work of the General Contractor. However, the Contractor shall be responsible for cooperation with the General Contractor in locating and sizing such openings. Openings required and not shown on Drawings shall be brought to the attention of the General Contractor promptly and the Architect/Engineer for approval.

#### **PART 16 - COORDINATION OF WALL OUTLETS**

- 16.1 The Contractor shall plan his work in such a manner that wall outlets that are adjacent to each other or within a given area, shall be installed at the same height, and with a symmetrical appearance.

#### **PART 17 - EXCAVATION AND BACKFILLING**

17.1 General

- A. Refer to Special Conditions in the Architectural Specifications and bid the rock and earth excavation in accordance with the requirements listed.

17.2 Excavation

- A. Rock excavation shall be made to a depth of 4" below conduit or ducts or as shown on the drawings. All conduit and/or ducts shall have 4" of dense graded aggregate installed above and below. The Contractor shall be responsible for locating in the field the lines shown on the drawings. The Contractor shall use reference points as shown on the drawings for locating control points on the lines. Trench bottom shall follow uniform grades insofar as possible and shall be relatively flat from side to side.
- B. Minimum depth of bury for all lines outside the building shall be 24" to top of pipe or as shown on the Drawings. The width of the trench above that level shall be as wide as necessary for sheathing and bracketing. All conduit under slab shall be deep enough to allow vertical code bends.

17.3 Dewatering And Shoring

- A. Trenching and other excavation shall be maintained adequately free of water and shall be adequately shored, where necessary to protect workmen, materials, equipment, and adjacent structures. Discharge from pumps, drains or bailing shall be placed in ditches, storm drains or natural drainageways. No extra will be paid for this work.

17.4 Backfilling

- A. Under all backfill conditions with exceptions as listed below, earth shall be hand-placed to a height of at least 6" above the top of the dense graded aggregate. After backfilling and tamping with earth to a depth of 6" above the top of the dense grade aggregate, the backfilling operation may be continued by a machine in 12" layers, compacted with approved mechanical tampers. Any trenches improperly backfilled, or where settlement occurs, shall be re-opened to the depth required and compacted with the surface restored to the required grade and compacted and smoothed off. All trenches which run under sidewalks, roadway, etc. shall be filled to sub-grade with dense graded aggregate.
- B. Dense graded aggregate shall be crushed limestone blended into a homogeneous mixture and graded in conformance with Article 208.2.0 of the latest edition of the Standard Specifications of the Kentucky Department of Highways.
- C. In trenches cut in existing paving, backfill with a flowable fill consisting of a blend of cement, sand and water and may also include fly ash or other materials. The mixture shall have a one day strength of 10-20 p.s.i. and a twenty eight day strength of 50-100 p.s.i. The fill shall be poured up to the bottom of the base of the specified paving repair.

17.5 Surplus Materials

- A. All surplus material, particularly rock, resulting from this operation shall be removed from the grounds. Disposal from the site of such materials is the responsibility of this Contractor. Earth shall be disposed of only after rock has been removed from the site.

## **PART 18 - FOUNDATIONS AND ANCHOR BOLTS**

- 18.1 The Contractor shall be responsible for the location of all concrete pads required for all equipment installed under this Contract. All pads required will be poured at the expense of the Contractor.
- 18.2 The Contractor shall furnish anchor bolts for all equipment installed on concrete slabs and/or bases. Bolts shall be placed in exact positions prior to pouring concrete. Sizes of bolts shall be determined by the manufacturer's recommendations for the equipment served.

## **PART 19 - OPERATING AND MAINTENANCE INSTRUCTIONS**

- 19.1 Deliver to the Architect three (3) copies of shop drawings and all Operating and Maintenance Instructions for all equipment furnished and installed under this Contract, including parts lists for all new major equipment items. Each set shall be provided in a plastic or hard back binder with table of contents and divider for each section.

## **PART 20 - FIRESTOPPING**

- 20.1 All openings required for conduit in walls, floors, ceilings, partitions, etc., where such construction is required for fire protection, shall be firestopped to preserve the fire rating of the construction. All materials used shall be approved for use as fire stop equal to 3M Fire Barrier. (Caulk CP-25, putty 303 and 7904 Barriers), or equal by Hilti (Caulk FS601, putty CB 120 Foam, FS611A barrier material, or FS635 Cable Tray).
- 20.2 All openings required for conduit in walls, floors, ceilings, partitions, etc., where such construction is not fire rated, shall be patched with mortar, caulking, etc.

## **PART 21 - SUSPENDED CEILINGS**

- 21.1 The Contractor shall insure that framing members of suspended ceiling systems used to support fixtures shall be securely fastened to each other and shall be securely attached to the building structure at necessary intervals (NEC).
- 21.2 If the above items are not covered, the Contractor shall immediately alert the Architect. Fixtures shall not be installed until all questions concerning the above are answered.
- 21.3 All recessed light fixtures shall be clipped to ceiling structure.

## **PART 22 - ELECTRICAL DRAWINGS AND SPECIFICATIONS**

- 22.1 The drawings and specifications are intended to cover all work enumerated under the respective headings. The drawings are diagrammatic only as far as final location of raceways, equipment, etc. is concerned. Any item of work not clearly included, specified and/or shown, any errors or conflict between plans (Mechanical, Electrical, Architectural or Structural) specifications, codes and field conditions, shall be clarified by a written request to the Architect by the Bidder before bidding; otherwise, the bidder shall, at his own expense, supply the proper labor and materials to make good any damages or defects in his work caused by such error, omission or conflict.

- 22.2 Schematics, risers and details shown on the drawings are for the equipment specified. All revisions, modifications or changes in circuitry, accessories, etc. due to using equipment of a different manufacturer than specified hereinafter, shall be the responsibility of the Bidder and shall be made at no additional cost to the Owner. All modifications or changes shall be submitted to the Architect in writing and meet his approval before the equipment is released for shipment.
- 22.3 The Contractor shall be responsible for all revisions, modifications or changes necessary in the Structural, Architectural or Mechanical/Electrical systems to accommodate the equipment to be furnished under this section of the specifications. This shall be made at no additional cost to the Owner.

## **PART 23 - APPLICATION FOR PAYMENT**

- 23.1 Line items and description of electrical work shall be as follows:

<b><u>Item No.</u></b>	<b><u>Description of Work</u></b>
1.	Bond & Permits
2.	Mobilization
3.	Distribution Equipment
4.	Lighting
5.	Wiring Devices
6.	Conduit & Boxes
7.	Wiring
8.	Excavation & B.F.
9.	Cutting & Patching
10.	Electrical Inspection

## **PART 24 - KEYS**

- 24.1 At the completion of the job, electrical contractor is to furnish to the Owner, (6) sets of keys on (6) metallic key rings for all key opened/operated electrical items, such as panelboards, equipment cabinets, key operated light switches, etc.

## **PAR5 25 - WARRANTY**

- 25.1 Contractor shall be responsible for warranting all work, including equipment, materials, and workmanship provided under this section. Unless indicated otherwise, under specific specification sections, this warranty shall be against all defects of the above and shall run a minimum period of one year from date of substantial completion.
- 25.2 Defective work, equipment, materials and workmanship that develops with the warranty period, which is not caused by ordinary wear, damage or abuse by others, shall be replaced or corrected without additional cost to Owner.

## **PART 26 - COORDINATION WITH OTHER TRADES**

- 26.1 The Contractor shall obtain and verify from the other trades all necessary information regarding motors, controls, and wiring connections of apparatus furnished by these trades.

- 26.2 Motor horsepowers and apparatus wattage ratings as indicated is on schedule or on drawings are estimated values, and corresponding sizes of feeders and other electrical equipment indicated to serve them are minimum sizes. Motors of greater horsepower and apparatus with larger wattage ratings may be provided. Where larger motors or apparatus with larger wattage ratings are provided, feeders and other electrical equipment serving them shall be increased in capacity to correspond. Increase in capacity of feeder and other apparatus shall be furnished at no additional cost to the Owner.

END OF SECTION



## **SECTION 16025 - SCOPE OF WORK**

### **PART 1 - GENERAL**

- 1.1 Except as otherwise hereinafter specified, the work under this Contract consists of furnishing all labor, materials, tools, elevating apparatus, transportation permits, certificates and equipment and performing all operations relevant to the installation of the Electrical Systems complete and working (unless otherwise noted) in strict accordance with this Specification and the applicable drawings, and all applicable codes, and subject to the terms and conditions of the Contracts. All systems shall be turned over to the Owner in a workable and usable condition.

### **PART 2 – WORK INCLUDED**

- 2.1 Without restricting the generality of the foregoing, the work to be performed under this Contract shall consist of furnishing, installing and connecting the following items:
- A. Power and Lighting Distribution.
  - B. Conduit, Fittings, Pull Boxes, Junction Boxes, Terminal Boxes.
  - C. Safety Switches as required by Code.
  - D. Wire and Cable installations and terminations.
  - E. Installation of Wiring of Starters, Controls, Switches and other electrical equipment furnished under other sections of these Specifications or Owner.
  - F. Receptacles and Lighting Outlets.
  - G. Lighting Fixtures and Lamps.
  - H. Motor Controls.
  - I. Grounding.
  - J. Megger testing of all wiring.
  - K. Connection to equipment furnished by others.
  - L. Raceways and wiring for temperature controls.

END OF SECTION

## SECTION 16050 - BASIC MATERIALS AND METHODS

### PART 1- RACEWAYS (CONDUIT, ETC.)

#### 1.1 Rigid

- A. Rigid, threaded steel conduit shall be used in concrete, underground in hazardous locations or where called for on the Drawings. All wiring above 600V. shall be rigid, unless otherwise noted.

#### 1.2 Intermediate

- A. Intermediate grade conduit may be used in lieu of rigid.

#### 1.3 Electric Metallic Tubing (EMT)

- A. Metallic tubing may be used where permitted by code, unless otherwise noted as rigid. No raceway smaller than 3/4" will be permitted except for vertical drops to switch legs, or receptacles which may be 1/2".

#### 1.4 PVC Conduit

- A. Nonmetallic schedule 40 PVC rigid conduit conforming to ANSI, NEMA specifications with each length U.L. labeled may be installed under concrete floor slabs buried deep enough to allow for vertical code bends for branch circuits when the following conditions are adhered to:
  - 1. Provide rigid steel conduit or IMC conduit where under-floor conduits penetrate the slab and above floor.
  - 2. Install equipment grounding conductors as required by N.E.C. and size conduits for number of conductors installed.
  - 3. P.V.C. conduit may also be used for primary service (from service pole to transformer) (Encased in 3" concrete under roadways). Use long radius steel ells.
  - 4. P.V.C. conduit shall not otherwise be allowed unless shown or noted on drawings.

#### 1.5 General Requirements

- A. Prior to and during installation, refer to system layout drawing containing all elements of the system.
  - 1. Work shall include furnishing all raceway and appropriate fittings and device plates to install a nonmetallic surface raceway system as indicated on the electrical drawings and in the specification. Installer shall comply with detailed manufacturer's instruction sheets which accompany system components as well as system instruction sheets.

- 1.6 All metallic conduit shall be electro-galvanized, sheradized, hot-dipped galvanized or metallized galvanized. Conduit shall be concealed, where possible, depending upon the structure of the building. All (exposed and concealed) runs of conduit shall have supports

spaced not more than 8' apart and shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends as shown on the Drawings. Expansion fittings or other approved devices shall be used to provide for expansion and contraction where conduit crosses expansion joints. Jumper for ground continuity in all cases. Conduit shall be installed so as to insure against trouble from collection of trapped condensation.

- 1.7 Flexible conduit for motors shall be liquid tight single strip, neoprene covered, and shall be used from motor terminal boxes to outlet or conduit for vibration purposes. Lengths of this flexible conduit shall not exceed 24" and shall be installed in such a manner so as to isolate vibration from the conduit. Connectors, as manufactured by Efcor, Thomas and Betts or Appleton will be acceptable.
- 1.8 All conduit systems, except those otherwise specifically shown to the contrary, shall be concealed in the building construction or run above suspended ceiling. All steel conduit installed below grade or slab shall be coated with an asphaltum tar manufactured for this purpose and approved by the Architect (conduit in stone fill shall be considered below slab and shall be so painted). This includes all conduit for outside lighting. (Pre-coated conduit may be used).
- 1.9 Runs of conduit shall not have more than the equivalent of three (3) 90 degree bends. Junction boxes shall be installed in conduit runs exceeding 100', whether shown on Drawings or not. Length requirement does not apply to underground circuits to outside lights.

## **PART 2- CABINETS, OUTLETS AND JUNCTION BOXES**

### **2.1 Cabinets, Junction And Pull Boxes**

- A. Cabinets for lighting and power, telephone, clocks or any other purposes specified or shown on the Drawings shall be constructed of panelboard code gauge, galvanized steel with sides formed and corner seams riveted or welded before galvanizing. Boxes constructed with sheet metal screws or bolts will not be accepted.
- B. Pull boxes shall include all boxes used to reduce the run of conduit to the required number of feet or bends for cables, supports, taps, troughs and other similar applications and shall also be constructed as specified above.
- C. All cabinets and boxes shall be provided with knockouts as required by the manufacturer, or shall be cut in the field by approved cutting tools which will provide a clean symmetrically cut opening. Such boxes shall be provided with code gauge fronts which shall have hinged doors with 1/4 turn fasteners.

### **2.2 Outlet Boxes**

- A. Lighting fixture outlet boxes shall be galvanized steel, 4" octagonal, not less than 2-1/8" deep, with lugs or ears to secure covers and those for use with ceiling lighting fixtures shall be fitted with 3/8" fixture studs fastened to the back of the boxes, where applicable.
- B. Outlet boxes for switches, receptacles, telephone, etc., installed in walls of glazed tile, brick or other masonry which will not be covered by wood wainscot or paneling shall be 4"x4"x1 1/2" with masonry extension and they shall be completely covered with plates or lighting fixtures.

All exposed boxes shall be FS type. No box will be allowed with the ears on the outside. The Contractor shall cooperate with the brick layers and carpenters to insure that the outlet boxes are installed straight and flush in the walls. Jumbo plates will not be allowed.

- C. Boxes for more than two devices shall be for number of devices required and shall be one piece. No ganging of single switch boxes will be allowed.
- D. Outlets for use on this project shall have only the holes necessary to accommodate the conduits at the point of installation and shall be rigidly secured in position.
- E. Unless otherwise noted on the electrical and architectural drawings or specified, the bottom of boxes shall be installed at the following heights:

Wall Switches	3'-8"
Convenience Outlets	1'-6"

- F. The location of fixtures, outlets and/or equipment, as shown on the drawings, shall be considered as approximate only. It shall be incumbent upon the Contractor to study the general building drawings, with relation to spaces surrounding each outlet, in order to coordinate this work with the work of others and in order that when the fixtures, outlets and/or equipment are installed, they will be symmetrically located and will not interfere with any other work or equipment. Any change in fixture layout shall be coordinated with the Architect before the change is made.
- G. Refer to separate articles for any special outlet boxes, etc. required for individual equipment.

### **PART 3 - CONDUCTORS**

- 3.1 All conductors on this project shall be copper. All circuits shall be sized as the load requires or as shown on the drawings. No conductor shall be less than #12 AWG. All conductors shall have THHN/THWN insulation. All conductors within fixture or equipment housing shall have temperature rating not less than recommended by fixture or equipment manufacturer.
- 3.2 Conductors No. 10 and smaller sizes of wire shall be solid. Conductors No. 8 and larger sizes of wire shall be stranded. The pulling of all wires and cable on this project shall be performed in strict compliance with Section 300 of the National Electrical Code. No conductor entering or leaving a cabinet or box shall be deflected in such a manner as to cause excess pressure on the conductor insulation. (See NEC).
- 3.3 All wire on this project shall be new, in good condition, and shall be delivered in standard coils. The color of the wire shall be selected to conform with the latest edition of the National Electrical Code with conductors phase color coded at each termination (red, blue and black). Neutral to be white and ground wire to be green. #12 and #10 wiring shall be supplied with colored insulation.
- 3.4 Refer to separate sections of this specification for any special conductors required.

### **PART 4 – SUPPORTS AND HANGERS FOR CONDUIT AND FIXTURES**

- 4.1 The Contractor shall be responsible for the support of all fixtures specified hereinafter. He shall not relocate them from the locations shown on the Drawings for the purpose of supporting them from existing angles, tee bars, bulb tees, etc.
- 4.2 Recessed fixtures supported from suspended ceiling framing members shall be securely fastened to the ceiling framing member as per N.E.C.
- 4.3 Raceways shall be run at least 6" from parallel flues, steam pipes, or hot water and refrigeration pipes. Raceways shall be supported each 8' unless special conditions require closer spacing. Individual horizontal runs of raceways shall be supported by Kindorf's C-144, C-147, C-149, C-247, C-248, C-249, HS-100, HS-400, HS-900, or equivalent as approved. Exposed runs shall be installed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings, and have all right angle turns consisting of constant radius bend or threaded fittings. Where two or more conduits run parallel or where specified, they shall be supported by a rack, trapeze or framework constructed of B-900 series channel. Wherever hanger rods are used in conjunction with channel to form a trapeze, B-900 series channel with holes such as B-903, B-905-2A, B-905, B-907 and B-995 shall be used and, in all cases, rigid conduit shall be fastened to the channel with C-105 straps, E.M.T. and C-106 straps, and O.D. tubing with C-107 straps.
- 4.4 Copper or steel wire hangers will not be acceptable to support any item under this Contract. Strap iron, properly installed, may be used for 1-1/4" conduit and smaller.
- 4.5 Where pipe supports and inserts have been specified by a particular manufacturer, pipe supports and inserts of equal quality and size, as manufactured by Elcen Metal Products or the Auto-Grip Division of Automatic Sprinkler Corporation will be acceptable.

## **PART 5 - SPECIALTIES**

- 5.1 All EMT terminations at junction boxes, panels, etc. shall be made with locknuts, case hardened, and appropriate fittings as manufactured by Thomas and Betts, Efcor, or ETP. All rigid conduit shall have double locknuts.
- 5.2 All conduit, except main and branch feeders, shall have insulated metallic bushings equal to OZ Type B. All branch and main feeders #6 and larger and all raceways entering a box thru concentric knockouts shall have insulated bushings with grounding lugs equal to Type BL as manufactured by OZ. Jumper ground lugs to box. All rigid conduit fittings shall be threaded metal type, not set screw type.
- 5.3 All EMT terminations shall have insulated throat fittings, Thomas and Betts "Insulined" fittings.
- 5.4 All conduit stubbed through floor during construction shall have openings protected with plastic caps approved for this purpose. Connections on both ends of all flexible conduit shall be Efcor.
- 5.5 Dead spring type pressure connectors will not be acceptable on this project. All connections shall be made with insulated pressure type connectors (live spring) as manufactured by Thomas and Betts, (connectors with rigid body will not be acceptable). All connections on conductors No. 8 and larger shall be made with Burndy Type KS.

- 5.6 Items as manufactured by OZ, Gedney, Thomas and Betts, Midwest, Efcor, or ETP will be considered equal.

END OF SECTION

## **SECTION 16140 - WIRING DEVICES**

### **PART 1 - GENERAL**

- 1.1 The work under this section consists of furnishing and installing all materials, equipment and services necessary for the installation of all wiring devices shown on the drawings and herein specified.
- 1.2 All receptacles and switches, insofar as possible, shall be of one (1) manufacturer.
- 1.3 All receptacles and switches shall be gray with stainless steel cover plates.
- 1.4 All receptacles shall be grounded type.
- 1.5 All outlets behind water coolers shall be concealed by water cooler when viewed from the front of the cooler. Refer to Shop Drawings furnished by Mechanical Contractor.
- 1.6 Hubbell, Arrow Hart, Bryant, P&S, Leviton and Cooper shall be considered as equal to bid.

### **PART 2 - GENERAL PURPOSE DUPLEX RECEPTACLES**

- 2.1 Duplex receptacles shall be 20 amp, 120 volts, 2-pole, 3-wire, NEMA 5-20R configuration, unless otherwise shown. Receptacles shall have the following characteristics:
  - A. "T" Type contacts for phase and neutral female connection.
  - B. Female ground connection shall be riveted to the bridge.
  - C. The bridge shall be of hot dipped steel.
  - D. The receptacle body shall be of heat resistant thermoset material.
  - E. Rivet connecting the face plate to bridge shall be spun brass.
- 2.2 Duplex receptacles shall be Hubbell 5352 Series.
- 2.3 Weatherproof receptacles shall be the same as "b" above with "Weatherproof while in Use" safety outlet enclosure. Enclosure shall be gasketed between the enclosure and the mounting surface and between the cover and base. Utilize stainless steel mounting hardware, constructed of flame retardant UV stabilized clear textured impact resistant polycarbonate, UL listed, NEMA 3R rated, pushbutton latch. Cover shall be Taymac vertical mount series.

### **PART 3 - GROUND FAULT INTERRUPTER RECEPTACLES**

- 3.1 Ground fault interrupter receptacle shall be duplex type suitable for mounting in a standard outlet box, rated 20 amps., 125 volts, 2-pole, 3-wire grounding type, with stainless steel face plate.
- 3.2 Device shall have a nominal sensitivity to ground leakage current of five milli-amperes and shall function to interrupt the current supply for any value of ground leakage current above

five milli-amperes on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th. of a second. All receptacles within 6 foot of a sink shall be GFI type, as well as other locations shown on the drawings.

- 3.3 Device shall be Hubbell #GF-5352.

#### **PART 4 - DEVICE PLATES**

- 4.1 All outlet boxes shall have a cover plate.
- 4.2 All device plates shall be stainless steel with captive matching screws.
- 4.3 All unused telephone outlets shall have a one-hole cover plate.
- 4.4 Mechanical Rooms and Janitor's closets wall plates shall be metal, corrosion resistant 302 stainless steel.

#### **PART 5 - REQUIRED SUBMITTALS**

- 5.1 Submit manufacturer's data on all wiring devices.

END OF SECTION



## **SECTION 16400 - DISTRIBUTION EQUIPMENT**

### **PART 1 - INCOMING SERVICE**

- 1.1 Service to this building shall originate at the pole mounted transformer provided by the utility company. Provision of 3 phase power to the site shall be the responsibility of the utility company. All costs associated with provision of 3 phase power to the site shall be borne by the owner and will not be included in the electrical contractor's bid price. Contractor shall coordinate installation of overhead secondary with local utility company. Contact: American Electric Power at 1-800-572-1141. Service to this building shall be 277/480-V., 3-phase, 4W, 60 Hz.
- 1.2 For bidding purposes assume electrical contractor is to set a utility pole appropriate to hold transformer. From pole, electrical contractor shall run secondary conduit and conductors to building service equipment.
- 1.3 Electrical contractor shall also coordinate with American Electric Power and provide temporary electric service for use during building construction.

### **PART 2 - MAIN SWITCHBOARD AND DISTRIBUTION PANELS**

- 2.1 Furnish and install the switchboard with a UL service entrance label where required. The switchboard shall be free standing in a NEMA 1 enclosure. The switchboard bussing is to be tin plated aluminum. The switchboard, as a complete unit, shall have a short circuit rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or drawing.
- 2.2 The main disconnect device shall be a molded case circuit breaker.
- 2.3 The distribution section shall be Group Mounted Circuit Breakers.
- 2.4 Switchboards shall be equal to Square D "Power Style", General Electric, Cutler-Hammer, ITE or Challenger "Power Master".

### **PART 3 - BRANCH PANELS (120/208V) & (277/480V)**

- 3.1 Furnish and install circuit breaker panelboards as indicated in the panelboard schedule and where shown on the plans. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or drawings. The panelboard is to be 20"W x 5-3/4"D and shall be listed by UL. Main service panelboard shall be rated for service equipment use. Panelboards shall be Square D, General Electric, Cutler-Hammer, ITE or Challenger "PRL-1".

### **PART 4 - BREAKERS**

- 4.1 Breakers for branch panels shall be molded case bolt-in type. Single pole breakers in branch panels shall have an interrupting capacity of not less than 10,000 amp. symmetrical at 208/120V. and 14,000 amp. sym. at 480/277V. unless otherwise noted on plans. Tandem breakers will not be allowed.

- 4.2 Breakers used for switching of lights shall be rated for switch duty and so noted.

## **PART 5 - DISCONNECT SWITCHES (NOT IN MAIN SWITCHGEAR)**

- 5.1 Provide disconnect switches where indicated on drawings or where required by Code although not indicated on Drawings.
- 5.2 Disconnect switches shall be fused or unfused as required by Code as indicated on the Drawings or as specified. They shall be housed in an enclosure suitable for the location in which they are installed. For instance, all outdoor units shall be NEMA 3R.
- 5.3 All fusible switches shall be heavy duty. All unfused switches shall be general duty.

## **PART 6 - LOW VOLTAGE FUSE**

- 6.1 Fuses 600 volts and less. Fuses shall not be shipped in switches in electrical equipment nor shall they be shipped to the job until the equipment is ready to be energized. All fuses shall be of the same manufacture to retain selectivity as designed. All fuses shall be installed by an Electrical Contractor.
- A. All fuses shall be current limiting with 200,000 amperes interrupting capacity.
  - B. U.L., Inc. Class L fuses (bolt-type dimensions 601 to 6000 amps) shall have minimum time delay of 10 seconds at current of 5 times rating and shall have O-ring gas seals at the end bells and silver links. Bussmann KRP-C HI-CAP Time-Delay Fuse or Littelfuse KLP-C Time-Delay Fuse.
  - C. U.L., Inc. Class RK1 fuses (standard dimensions 600 amperes or less) shall be installed in the switches serving circuit breaker panels unless otherwise noted. Bussmann LPN-RK or LPS-RK LOW PEAK Dual-Element Fuses or Littelfuse LLN-RK or LLS-RK Littelfuse Dual-Element Fuses.
  - D. U.L., Inc. Class RK1 fuses (standard dimensions 600 amperes or less) shall be installed in all other switches and shall be dual-element, time-delay type with a spring actuated thermal overload element that operates at 284°F. temperature. Bussmann LPN-RK or LPS-RK LOW PEAK Dual-Element Fuse or Littelfuse LLN-RK or LLS-RK Littelfuse Dual-Element Fuses.
  - E. Motor protection dual-element fuses installed in individual circuits shall be sized at 125% of motor nameplate current rating or the next standard fuse size. Where excessive ambient temperature, high inertia motor loads or frequent "On-Off" cycling requires larger fuses, consult the Electrical Designer. Use fuse reducers where fuse gaps are larger than fuse dimension. Bussmann LPN-RK or LPS-RK LOW PEAK Dual-Element Fuse or Littelfuse LLN-RK or LLS-RK Littelfuse Dual-Element Fuse.
  - F. Ten percent spare fuses or a minimum of three of each size and type shall be placed in a spare fuse cabinet wall mounted near the electric service. Mount a spare fuse cabinet similar to the "Bussmann Spare Fuse Cabinet", Catalog No. SFC or "Littelfuse Spare Fuse Cabinet" Catalog #LSFC.
  - G. Lighting Fixture Fuse Protection.

1. Fluorescent fixtures (1 Fuse/Fixture) shall be protected with Littelfuse LGR Fuse (LHR Holder) Type GLR fuses (HLR holders) installed at the fixture in addition to any internal ballast thermal protection. Size the fuse according to manufacturers recommendations.
2. Other lighting fixtures, H.I.D. fixture ballasts, etc. shall be protected individually with KTK (Littelfuse KTK fuses) fuses, mounted in HEB Series fuse holders. Size the fuse according to manufacturers recommendations.

## **PART 7 - TRANSFORMERS**

- 7.1 Provide, where shown on the drawings, Sorgel or equal dry type transformer of size indicated. Transformer shall be in NEMA 1 enclosure with Class H insulation, 150°C rise with full capacity primary taps (2-2½% above and below).
- 7.2 All transformers shall be UL labeled and BIL rating as specified by ANSI Standards. Sound rating shall be NEMA and ANSI Standards.

## **PART 8 - REQUIRED SUBMITTALS**

- 8.1 Submit manufacturer's data on all panelboards, transformers, and disconnect switches.

END OF SECTION

## SECTION 16500 - LIGHTING

### PART 1 - GENERAL REQUIREMENTS

- 1.1 Lighting fixtures shall be of the types, sizes, etc. as specified in Light Fixture Schedule on Drawings. The lighting fixtures specified are intended to indicate the general fixture type required. All fixtures shall be U.L. listed. All general requirements shall be required unless otherwise noted in detail specifications for each fixture.
- 1.2 The necessary precautions shall be exercised during the course of construction to protect the fixtures from dirt, dust, and debris. All fixtures shall be cleaned before the project is accepted.
- 1.3 The Contractor shall install lamps in all lighting fixtures and they shall be of one manufacturer such as Osram/Sylvania, General Electric, Westinghouse or Phillips.
- 1.4 Fixture housing, chassis and/or channel shall not be less than 20 gauge steel of rigid construction and shall be finished with a baked-on white enamel over a zinc phosphate undercoating. Wiring shall be secured by clips or similar means. All doors shall be extruded aluminum with a positive type latch.
- 1.5 Reflectors separate from housings for fluorescent fixtures shall not be less than 22 gauge steel furnished with baked-on white enamel with not less than 0.85 initial reflection factor unless otherwise specified.
- 1.6 Each ballast shall be designed to start and satisfactorily operate the type of lamp required in the particular fixtures. Ballasts shall be securely fastened in place with mounting surface of ballast making as complete contact with surface of ballast mounting area of fixture as practical. Refer to individual fixture if special ballasts are required.
- 1.7 Magnetic ballasts shall be high power factor, rapid start or 800 ma. ETL, CBM, "P" rated.
- 1.8 Fluorescent ballast to be high performance electronic to operate at a frequency of 25KHz or higher with less than 2% lamp flicker, at an input voltage of 108 to 132 VAC (120 volt line) or 249 to 305 VAC (277 volt line) at an input frequency of 60 Hz minimum of .99 power factor. Light output to remain constant for line voltage of + 5%. Ballast to comply with EMI and RFI limits set by FCC (CFR 47 part 18) for normal electrical equipment and have less than 1.5 lamp current crest factor (LCCF). Units shall be instant start except slimline and maintain full cathode heat during operation. Ballast to meet ANSI standard (82.) and UL listed Class P Type I outdoor. Ballast shall be non-PCB and operate lamps in parallel. Failure of one or more lamps should not extinguish other lamps. Ballast to have less than 10% total harmonic distortion and less than 6% third harmonic distortion. Ballast to have A sound rating with a power factor greater than .99 and have a twenty year rated lamp life. Ballast to operate 1, 2, 3, or 4 T8 or T12 lamps as specified in fixture specification. Number of ballasts in multi-lamped fixture to be determined by switching or multiple fed luminaires. Responsibility for correct number of ballasts in luminaires and correct voltage to be responsibility of fixture suppliers. Advance, Magnetek or Valmont are acceptable manufacturers.
- 1.9 Refer to Section on "Fuses" for fixture fuses.
- 1.10 Fluorescent Lampholders

- A. Fluorescent lampholders shall be of such design that lamps will be held firmly in place, electrically and mechanically secure and shall permit easy insertion or removal of lamps.
- B. Lampholders shall be rigidly (19 gauge) and securely fastened by bolts or screws to the mounting surface with necessary provisions to prevent lampholders from turning.
- C. Snap-in type holders will not be allowed. The dimensions of lampholders shall be such as to position lamp tube not less than 1/8" from mounting surface of reflector. All lampholders in the industrial, open fixtures shall be spring loaded, turret type, heavy duty.

1.11 Metal Halide Sockets

- A. All mercury and metal halide (250 watts and above) shall be split type to insure that lamps will not freeze in socket. The center contact shall be spring loaded.

1.12 Lamps

A. Fluorescent

- 1. Rapid Start - T-8, 3500K.

B. H.I.D.

- 1. All mercury to be deluxe white, color corrected.
- 2. All metal halide to be phosphor coated.

C. Incandescent

- 1. All incandescent lamps shall be inside frosted rated for 2500 hours life.

1.13 Lens

- A. All flat lens, unless otherwise noted, shall be injection molded virgin acrylic, prismatic, which shall weigh not less than .75 pounds per square foot.
- B. Refer to each fixture for type of lens used. Other than flat lens are specified with fixtures.

- 1.14 All recessed fixtures shall be securely fastened to ceiling framing member by mechanical means such as bolts, screws, nuts or clips manufactured for this purpose. (Wire lashing of each fixture to roof or floor structure above will be acceptable).

1.15 Substitutions

- A. Fixture substitutions must be made through the equipment supplier's representative ten (10) days prior to the bid date. The equipment supplier's representative is to furnish the Engineer with original fixture brochures, photometrics and point by point computer printouts for consideration of written prior approval.

- B. Inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of these specifications.

1.16 Light Fixture Schedule (See Electrical Drawings)

- A. Catalog numbers are for style and quality only. The Contractor shall be responsible to determine the type of ceiling that fixtures are to be installed and to so order fixtures even though catalog numbers may indicate other type of ceiling.

NOTE: All Manufacturers Including Those Specified Wishing To Bid Job Must Submit To The Engineer Original Fixture Brochures, Photometrics, And Point-By-Point Computer Printouts Ten (10) Days Prior To Bid Date For Consideration Of Written Approval.

**PART 2 - GENERAL INSTALLATION REQUIREMENTS**

- 2.1 Deliver lighting fixtures individually wrapped in factory-fiberboard type containers.
- 2.2 Install lighting fixtures of types indicated, where indicated, and at indicated heights; in accordance with lighting fixture manufacturer's written instructions and recognized industry practices to ensure that fixtures comply with requirements and serve intended purposes. Comply with NEMA standards, and requirements of NEC pertaining to installation of lighting fixtures.
- 2.3 Set lighting fixtures and equipment plumb, square, and level and secure to structural support members of building. Provide all steel supports necessary for lighting fixtures in addition to those specified under general building construction. Recessed and semi-recessed fixtures shall be supported independent of suspended ceiling system. Secure fixtures in suspended ceilings to framing members in accordance with NEC by using standard clips made for the purpose. Sheet metal screws are not acceptable.
- 2.4 Mounting heights specified or indicated shall be to bottom of fixture. Coordinate exact mounting of lighting fixture with type, style and pattern of ceiling being installed.
- 2.5 Clean interior lighting fixtures of dirt and debris upon completion of installation. Protect installed fixtures from damage during remainder of construction period.
- 2.6 At date of substantial completion, replace lamps in lighting fixtures which are observed to be inoperable or noticeably dimmed after Contractors use and testing, as judged by Architect/Engineer.
- 2.7 Set time switches for operation as directed by the Owner and/or Architect/Engineer.

**PART 3 - REQUIRED SUBMITTALS**

- 3.1 Submit light fixture shop drawings and manufacturer's data booklet form with a separate sheet for each fixture, assembled in luminaire type alphabetical order as shown in the light fixture schedule, with proposed fixture and accessories clearly indicated on each sheet.

END OF SECTION

## **SECTION 16900 - CONTROLS**

### **PART 1 - MAGNETIC STARTERS**

- 1.1 All motor starters shall be steel mounted, front wired with all terminals accessible for wiring directly from the front. No slate or ebony asbestos will be permitted on any size starter. All contacts shall be double break, solid silver cadmium oxide alloy, or approved equal, which will not require any filing, dressing or cleaning throughout the life of the control equipment. Bare copper or silver flashed copper contacts which require periodic filing or cleaning maintenance will not be permitted. Operating coils shall be pressure molded and so designed that if accidentally connected to excessive voltage, they will not expand, bubble or melt. When a coil fails under this condition, the starter shall definitely drop out by gravity and not freeze the starter in the "On" position. All motor starter coils shall be rated 120 volts unless shown otherwise on the Drawings. All magnetic motor starters shall have control transformers (one side fuse, the other grounded to box). Each magnetic starter shall be provided with one (1) spare N.O. and one (1) N.C. auxiliary contact. Transformer shall be sized to handle the loads shown in the Schedule and Schematics. No starter smaller than Size "0" shall be utilized. Refer to Schedule under MCC for starter sizes.

### **PART 2 - PHASE PROTECTION**

- 2.1 All motors 10 HP and above shall have phase failure protection to include: Phase Loss, Phase Unbalance, Phase Reversal, and Undervoltage.

### **PART 3 - CAPACITORS**

- 3.1 All motors 10 HP and above to have fused power capacitors with blown fuse indication and sized to correct to 95% power factor.

### **PART 4 - OVERLOAD RELAYS**

- 4.1 Overload relays shall be of the melting alloy, hand-reset, trip-free variety. All overload relays shall be equipped with a trip indicator, visible from the front, which will indicate which motor has tripped. Overloads shall be installed in all ungrounded legs.
- 4.2 Taking into account the temperature rating of the motors, overloads shall be sized for one of three conditions:
- A. Temperature at starter is the same as motors.
  - B. Temperature at starter is lower than at motor.
  - C. Temperature at starter is higher than at motor.
- 4.3 All overloads shall be sized from data on motor nameplate taking into consideration the above three (3) items. The sizing of overloads is the responsibility of the Contractor. Submit written list of overload vs. motors FLC to Engineer on all motors.
- 4.4 It shall be possible to field add two (2) extra N.O. or N.C. contacts in all motor starters without removing existing wiring or removing the starter from the enclosure.

### **PART 5 - PUSHBUTTONS, SWITCHES, PILOT LIGHTS, ETC.**



- 5.1 Pushbuttons and switches shall be heavy duty, double-break silver contacts. Buttons shall have means of installing metal plate to designate function.
- 5.2 Pilot lights shall be press-to-test, 120 volts incandescent. Refer to Drawings for typical control diagram.
- 5.3 Unless otherwise shown, all pushbuttons, switches, pilot lights, etc. shall be mounted in the face of the respective starters. Remote buttons, etc. shall be flush mounted where shown.

## **PART 6 - MANUAL STARTERS**

- 6.1 Furnish and install, where shown on Drawings, 1 or 2 pole toggle operated manual starters. Starters shall be surface unless otherwise shown and shall have neon pilot lights. Starters shall be in a NEMA 1 enclosure. Heaters shall be sized from motor nameplate data.

## **PART 7 - AC COMBINATION STARTER**

### **7.1 General**

- A. Combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes and horsepower ratings. Disconnect switch combination starters shall consist of a visible blade disconnect switch and a motor starter. Combination starters shall be mounted in general purpose enclosures unless otherwise indicated on the plans.

### **7.2 Starters**

- A. All starters used in combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes, and horsepower ratings. These starters shall be furnished with three melting alloy type thermal overload relays.

### **7.3 Thermal Units**

- A. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

### **7.4 Disconnect Handle**

- A. The disconnect handle used on combination starters shall always be in control of the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF", and shall include a two-color handle grip, the black side visible in the "OFF" position indicating a safe condition, and the red side visible in the "ON" position indicating an unsafe or danger condition.

## **PART 8 - REQUIRED SUBMITTALS**

- 8.1 Submit manufacturer's data on all control/starter devices.

END OF SECTION