CMT
Crawford, Murphy & Tilly

PROJECT MANUAL

FOR: **Building Repairs: Salt Storage Building**

Tazewell County Highway Department
21308 IL Route 9
Tremont, IL 61568

BID SET

SECTION 21-00000-02-MG
MOTOR FUEL TAX FUNDING

DATE: **March 15, 2022**

PREPARED BY: Crawford, Murphy & Tilly, Inc.
2750 West Washington St.
Springfield, IL 62702
(217) 787-8050

CMT Project No. 22001132.01

Submitted/Approved

County Engineer Superintendent of Highways

24 Apr 2023
Date

Department of Transportation

☐ Released for bid based on limited review

Regional Engineer

Date

Illinois Department of Transportation

Local Public Agency
Formal Contract Proposal

COVER SHEET

Proposal Submitted By:

Contractor's Name

Contractor's Address | City | State | Zip Code

STATE OF ILLINOIS

Local Public Agency: Tazewell County | County: Tazewell | Section Number: 21-00000-02-MG

Route(s) (Street/Road Name): Salt Storage Building | Type of Funds: MFT

☐ Proposal Only ☐ Proposal and Plans ☒ Proposal only, plans are separate

Submitted/Approved
For Local Public Agency:

For a County and Road District Project

Submitted/Approved

Highway Commissioner Signature & Date

Submitted/Approved

County Engineer/Superintendent of Highways Signature & Date

Dan Parr
Digitally signed by Dan Parr
Date: 2023.04.24 08:44:37 -05'00'

For a Municipal Project

Submitted/Approved/Passed

Signature & Date

Official Title

Department of Transportation

Released for bid based on limited review

Regional Engineer Signature & Date

Kensil A. Garnett
Digitally signed by Kensil A. Garnett
Date: 2023.04.24 17:05:25 -05'00'

Note: All proposal documents, including Proposal Guaranty Checks or Proposal Bid Bonds, should be stapled together to prevent loss when bids are processed.

Local Public Agency	County	Section Number	Route(s) (Street/Road Name)
Tazewell County	Tazewell	21-00000-02-MG	Salt Storage Building

NOTICE TO BIDDERS

Sealed proposals for the project described below will be received at the office of the Tazewell County Engineer (Name of Office)

21308 Illinois Route 9; Tremont, IL 61568 (Address) until 1:30 PM (Time) on 05/18/23 (Date).

Sealed proposals will be opened and read publicly at the office of the Tazewell County Engineer (Name of Office)

21308 Illinois Route 9; Tremont, IL 61568 (Address) at 1:30 PM (Time) on 05/18/23 (Date).

DESCRIPTION OF WORK

Location	Project Length
21308 Illinois Route 9; Tremont, IL 61568	n/a

Proposed Improvement

Construct a Salt Dome and related site improvements at the County Highway Department property

1. Plans and proposal forms will be available in the office of

the Tazewell County Engineer
21308 IL Route 9
Tremont, IL 61568

2. ☐ Prequalification

   If checked, the 2 apparent as read low bidders must file within 24 hours after the letting an "Affidavit of Availability" (Form BC 57) in triplicate, showing all uncompleted contracts awarded to them and all low bids pending award for Federal, State, County, Municipal and private work. One original shall be filed with the Awarding Authority and two originals with the IDOT District Office.

3. The Awarding Authority reserves the right to waive technicalities and to reject any or all proposals as provided in BLRS Special Provision for Bidding Requirements and Conditions for Contract Proposals.

4. The following BLR Forms shall be returned by the bidder to the Awarding Authority:
   a. Local Public Agency Formal Contract Proposal (BLR 12200)
   b. Schedule of Prices (BLR 12201)
   c. Proposal Bid Bond (BLR 12230) (if applicable)
   d. Apprenticeship or Training Program Certification (BLR 12325) (do not use for project with Federal funds.)
   e. Affidavit of Illinois Business Office (BLR 12326) (do not use for project with Federal funds)

5. The quantities appearing in the bid schedule are approximate and are prepared for the comparison of bids. Payment to the Contractor will be made only for the actual quantities of work performed and accepted or materials furnished according to the contract. The scheduled quantities of work to be done and materials to be furnished may be increased, decreased or omitted as hereinafter provided.

6. Submission of a bid shall be conclusive assurance and warranty the bidder has examined the plans and understands all requirements for the performance of work. The bidder will be responsible for all errors in the proposal resulting from failure or neglect to conduct an in depth examination. The Awarding Authority will, in no case, be responsible for any costs, expenses, losses or changes in anticipated profits resulting from such failure or neglect of the bidder.

7. The bidder shall take no advantage of any error or omission in the proposal and advertised contract.

8. If a special envelope is supplied by the Awarding Authority, each proposal should be submitted in that envelope furnished by the Awarding Agency and the blank spaces on the envelope shall be filled in correctly to clearly indicate its contents. When an envelope other than the special one furnished by the Awarding Authority is used, it shall be marked to clearly indicate its contents. When sent by mail, the sealed proposal shall be addressed to the Awarding Authority at the address and in care of the official in whose office the bids are to be received. All proposals shall be filed prior to the time and at the place specified in the Notice to Bidders. Proposals received after the time specified will be returned to the bidder unopened.

9. Permission will be given to a bidder to withdraw a proposal if the bidder makes the request in writing or in person before the time for opening proposals.

Local Public Agency	County	Section Number	Route(s) (Street/Road Name)
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PROPOSAL

1. Proposal of _____
Contractor's Name

_____.
Contractor's Address

2. The plans for the proposed work are those prepared by Crawford, Murphy & Tilly, Inc.
and approved by the Department of Transportation on Apr 24, 2023.

3. The specifications referred to herein are those prepared by the Department of Transportation and designated as "Standard Specifications for Road and Bridge Construction" and the " Supplemental Specifications and Recurring Special Provisions" thereto, adopted and in effect on the date of invitation for bids.

4. The undersigned agrees to accept, as part of the contract, the applicable Special Provisions indicated on the "Check Sheet for Recurring Special Provisions" contained in this proposal.

5. The undersigned agrees to complete the work within _____ working days or by 10/31/23 unless additional time is granted in accordance with the specifications.

6. The successful bidder at the time of execution of the contract will be required to deposit a contract bond for the full amount of the award. When a contract bond is not required, the proposal guaranty check will be held in lieu thereof. If this proposal is accepted and the undersigned fails to execute a contract and contract bond as required, it is hereby agreed that the Bid Bond of check shall be forfeited to the Awarding Authority.

7. Each pay item should have a unit price and a total price. If no total price is shown or if there is a discrepancy between the products of the unit price multiplied by the quantity, the unit price shall govern. If a unit price is omitted, the total price will be divided by the quantity in order to establish a unit price. A bid may be declared unacceptable if neither a unit price nor a total price is shown.

8. The undersigned submits herewith the schedule of prices on BLR 12201 covering the work to be performed under this contract.

9. The undersigned further agrees that if awarded the contract for the sections contained in the combinations on BLR 12201, the work shall be in accordance with the requirements of each individual proposal for the multiple bid specified in the Schedule for Multiple Bids below.

10. A proposal guaranty in the proper amount, as specified in BLRS Special Provision for Bidding Requirements and Conditions for Contract Proposals, will be required. Bid Bonds will be allowed as a proposal guaranty. Accompanying this proposal is either a bid bond, if allowed, on Department form BLR 12230 or a proposal guaranty check, complying with the specifications, made payable to: County Treasurer of Tazewell County.
The amount of the check is _____ (_____).

Attach Cashier's Check or Certified Check Here

In the event that one proposal guaranty check is intended to cover two or more bid proposals, the amount must be equal to the sum of the proposal guaranties which would be required for each individual bid proposal. If the proposal guaranty check is placed in another bid proposal, state below where it may be found.

The proposal guaranty check will be found in the bid proposal for: Section Number 21-00000-02-MG.

Local Public Agency	County	Section Number	Route(s) (Street/Road Name)
Tazewell County	Tazewell	21-00000-02-MG	Salt Storage Building

CONTRACTOR CERTIFICATIONS

The certifications hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder.

1. **Debt Delinquency.** The bidder or contractor or subcontractor, respectively, certifies that it is not delinquent in the payment of any tax administered by the Department of Revenue unless the individual or other entity is contesting, in accordance with the procedure established by the appropriate Revenue Act, its liability for the tax or the amount of the tax. Making a false statement voids the contract and allows the Department to recover all amounts paid to the individual or entity under the contract in a civil action.

2. **Bid-Rigging or Bid Rotating**. The bidder or contractor or subcontractor, respectively, certifies that it is not barred from contracting with the Department by reason of a violation of either 720 ILCS 5/33E-3 or 720 ILCS 5/33E-4.

   A violation of section 33E-3 would be represented by a conviction of the crime of bid-rigging which, in addition to Class 3 felony sentencing, provides that any person convicted of this offense, or any similar offense of any state or the United States which contains the same elements as this offense shall be barred for 5 years from the date of conviction from contracting with any unit of State or local government. No corporation shall be barred from contracting with any unit of State or local government as a result of a conviction under this Section of any employee or agent of such corporation if the employee so convicted is no longer employed by the corporation: (1) it has been finally adjudicated not guilty or (2) if it demonstrates to the governmental entity with which it seeks to contract that entity finds that the commission of the offense was neither authorized, requested, commanded, nor performed by a director, officer or a high managerial agent on behalf of the corporation.

   A violation of Section 33E-4 would be represented by a conviction of the crime of bid-rotating which, in addition to Class 2 felony sentencing, provides that any person convicted of this offense or any similar offense of any state or the United States which contains the same elements as this offense shall be permanently barred from contracting with any unit of State of Local government. No corporation shall be barred from contracting with any unit of State or Local government as a result of a conviction under this Section of any employee or agent of such corporation if the employee so convicted is no longer employed by the corporation and: (1) it has been finally adjudicated not guilty or (2) if it demonstrates to the governmental entity with which it seeks to contract and that entity finds that the commission of the offense was neither authorized, requested, commanded, nor performed by a director, officer or a high managerial agent on behalf of the corporation.

3. **Bribery.** The bidder or contractor or subcontractor, respectively, certifies that, it has not been convicted of bribery or attempting to bribe an officer or employee of the State of Illinois or any unit of local government, nor has the firm made an admission of guilt of such conduct which is a matter or record, nor has an official, agent, or employee of the firm committed bribery or attempted bribery on behalf of the firm and pursuant to the direction or authorization of a responsible official of the firm.

4. **Interim Suspension or Suspension.** The bidder or contractor or subcontractor, respectively, certifies that it is not currently under a suspension as defined in Subpart I of Title 44 Subtitle A Chapter III Part 6 of the Illinois Administrative code. Furthermore, if suspended prior to completion of this work, the contract or contracts executed for the completion of this work may be canceled.

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SIGNATURES

(If an individual)

Bidder Signature & Date

Business Address

City | State | Zip Code

(If a partnership)

Firm Name

Signature & Date

Title

Business Address

City | State | Zip Code

Insert the Names and Addresses of all Partners

(If a corporation)

Corporate Name

Signature & Date

Title

Business Address

City | State | Zip Code

Insert Names of Officers

President

Secretary

Attest:

Secretary

Treasurer

Illinois Department of Transportation

Schedule of Prices

Contractor's Name

Contractor's Address | City | State | Zip Code

Local Public Agency | County | Section Number

Tazewell County | Tazewell | 21-00000-02-MG

Route(s) (Street/Road Name)

Salt Storage Building

Schedule for Multiple Bids

Combination Letter	Section Included in Combinations	Total

Schedule for Single Bid

(For complete information covering these items, see plans and specifications.)

Item Number	Items	Unit	Quantity	Unit Price	Total
1	Civil Site Work (Base Bid)	1	L SUM		
2	Dome Material & Installation	1	L SUM		
3	Concrete Foundation Wall	1	L SUM		
4	Electrical Work	1	L SUM		
				TOTAL BASE BID	
5	Alternate Bid #1 (PCC Pvmt.)	1	L SUM		
				TOTAL BASE & ALTERNATE BID	
				Bidder's Total Proposal	

1. Each pay item should have a unit price and a total price.
2. If no total price is shown or if there is a discrepancy between the product of the unit price multiplied by the quantity, the unit price shall govern.
3. If a unit price is omitted, the total price will be divided by the quantity in order to establish a unit price.
4. A bid may be declared unacceptable if neither a unit price or total price is shown.

Illinois Department of Transportation

Local Public Agency Proposal Bid Bond

Local Public Agency	County	Section Number
Tazewell County	Tazewell	21-00000-02-MG

WE, _____ as PRINCIPAL, and

_____ as SURETY, are held jointly, severally and firmly bound unto the above Local Public Agency (hereafter referred to as "LPA") in the penal sum of 5% of the total bid price, or for the amount specified in the proposal documents in effect on the date of invitation for bids, whichever is the lesser sum. We bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly pay to the LPA this sum under the conditions of this instrument.

WHEREAS THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH that, the said PRINCIPAL is submitting a written proposal to the LPA acting through its awarding authority for the construction of the work designated as the above section.

THEREFORE if the proposal is accepted and a contract awarded to the PRINCIPAL by the LPA for the above designated section and the PRINCIPAL shall within fifteen (15) days after award enter into a formal contract, furnish surety guaranteeing the faithful performance of the work, and furnish evidence of the required insurance coverage, all as provided in the "Standard Specifications for Road and Bridge Construction" and applicable Supplemental Specifications, then this obligation shall become void; otherwise it shall remain in full force and effect.

IN THE EVENT the LPA determines the PRINCIPAL has failed to enter into a formal contract in compliance with any requirements set forth in the preceding paragraph, then the LPA acting through its awarding authority shall immediately be entitled to recover the full penal sum set out above, together with all court costs, all attorney fees, and any other expense of recovery.

IN TESTIMONY WHEREOF, the said PRINCIPAL and the said SURETY have caused this instrument to be signed by their respective officers this _____ (Day) of _____ (Month and Year)

Principal

Company Name	Company Name
Signature & Date	Signature & Date
By:	By:
Title	Title

(If Principal is a joint venture of two or more contractors, the company names, and authorized signatures of each contractor must be affixed.)

Surety

Name of Surety	Signature of Attorney-in-Fact Signature & Date
	By:

STATE OF IL

COUNTY OF

I _____ , a Notary Public in and for said county do hereby certify that

_____

(Insert names of individuals signing on behalf of PRINCIPAL & SURETY)

who are each personally known to me to be the same persons whose names are subscribed to the foregoing instrument on behalf of PRINCIPAL and SURETY, appeared before me this day in person and acknowledged respectively, that they signed and delivered said instruments as their free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this _____ (Day) day of _____ (Month and Year) .

Notary Public Signature & Date

(SEAL, if required by the LPA)

Date commission expires _____

Local Public Agency	County	Section Number
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ELECTRONIC BID BOND

☐ **Electronic bid bond is allowed (box must be checked by LPA if electronic bid bond is allowed)**

The Principal may submit an electronic bid bond, in lieu of completing the above section of the Proposal Bid Bond Form. By providing an electronic bid bond ID code and signing below, the Principal is ensuring the identified electronic bid bond has been executed and the Principal and Surety are firmly bound unto the LPA under the conditions of the bid bond as shown above. (If PRINCIPAL is a joint venture of two or more contractors, an electronic bid bond ID code, company/Bidder name title and date must be affixed for each contractor in the venture.)

Electronic Bid Bond ID Code

Company/Bidder Name

Signature & Date

Title

Illinois Department of Transportation

Apprenticeship and Training Program Certification

Local Public Agency	County	Street Name/Road Name	Section Number
Tazewell County	Tazewell	Salt Storage Building	21-00000-02-MG

All contractors are required to complete the following certification

☒ For this contract proposal or for all bidding groups in this deliver and install proposal.

☐ For the following deliver and install bidding groups in this material proposal.

Illinois Department of Transportation policy, adopted in accordance with the provisions of the Illinois Highway Code, requires this contract to be awarded to the lowest responsive and responsible bidder. The award decision is subject to approval by the Department. In addition to all other responsibility factors, this contract or deliver and install proposal requires all bidders and all bidder's subcontractors to disclose participation in apprenticeship or training programs that are (1) approved by and registered with the United States Department of Labor's Bureau of Apprenticeship and Training, and (2) applicable to the work of the above indicated proposals or groups. Therefore, all bidders are required to complete the following certification:

1. Except as provided in paragraph 4 below, the undersigned bidder certifies that it is a participant, either as an individual or as part of a group program, in an approved apprenticeship or training program applicable to each type of work or craft that the bidder will perform with its own employees.

2. The undersigned bidder further certifies, for work to be performed by subcontract, that each of its subcontractors either (A) is, at the time of such bid, participating in an approved, applicable apprenticeship or training program; or (B) will, prior to commencement of performance of work pursuant to this contract, establish participation in an approved apprenticeship or training program applicable to the work of the subcontract.

3. The undersigned bidder, by inclusion in the list in the space below, certifies the official name of each program sponsor holding the Certificate of Registration for all of the types of work or crafts in which the bidder is a participant and that will be performed with the bidder's employees. Types of work or craft that will be subcontracted shall be included and listed as subcontract work. The list shall also indicate any type of work or craft job category for which there is no applicable apprenticeship or training program available.

4. Except for any work identified above, if any bidder or subcontractor shall perform all or part of the work of the contract or deliver and install proposal solely by individual owners, partners or members and not by employees to whom the payment of prevailing rates of wages would be required, check the following box, and identify the owner/operator workforces and positions of ownership. ☐

The requirements of this certification and disclosure are a material part of the contract, and the contractor shall require this certification provision to be included in all approved subcontracts. The bidder is responsible for making a complete report and shall make certain that each type of work or craft job category that will be utilized on the project is accounted for and listed. The Department at any time before or afterward may require the production of a copy of each applicable Certificate of Registration issued by the United States Department of Labor evidencing such participation by the contractor and any or all of its subcontractors. In order to fulfill the participation requirement, it shall not be necessary that any applicable program sponsor be currently taking or that it will take applications for apprenticeship, training or employment during the performance of the work of this contract or deliver and install proposal.

Bidder

Signature & Date

Title

Address	City	State	Zip Code

Illinois Department of Transportation

Affidavit of Illinois Business Office

Local Public Agency	County	Street Name/Road Name	Section Number
Tazewell County	Tazewell	Salt Storage Building	21-00000-02-MG

I, _____ of _____ , _____ ,
Name of Affiant | City of Affiant | State of Affiant

being first duly sworn upon oath, state as follows:

1. That I am the _____ of _____ .
Officer or Position | Bidder

2. That I have personal knowledge of the facts herein stated.

3. That, if selected under the proposal described above, _____ , will maintain a business office in the
Bidder

State of Illinois, which will be located in _____ County, Illinois.
County

4. That this business office will serve as the primary place of employment for any persons employed in the construction contemplated by this proposal.

5. That this Affidavit is given as a requirement of state law as provided in Section 30-22(8) of the Illinois Procurement Code.

Signature & Date

Print Name of Affiant

Notary Public

State of IL

County _____

Signed (or subscribed or attested) before me on _____ by
(date)

_____ , authorized agent(s) of
(name/s of person/s)

_____ .
Bidder

Notary Public Signature & Date

(SEAL)

My commission expires _____

INDEX
FOR
SUPPLEMENTAL SPECIFICATIONS
AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2023

This index contains a listing of SUPPLEMENTAL SPECIFICATIONS and frequently used RECURRING SPECIAL PROVISIONS.

ERRATA Standard Specifications for Road and Bridge Construction (Adopted 1-1-22) (Revised 1-1-23)

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Check Sheet for Recurring Special Provisions

Local Public Agency	County	Section Number
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☐ **Check this box for lettings prior to 01/01/2023.**

The Following Recurring Special Provisions Indicated By An "X" Are Applicable To This Contract And Are Included By Reference:

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The Following Local Roads And Streets Recurring Special Provisions Indicated By An "X" Are Applicable To This Contract And Are Included By Reference:

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Special Provisions

Local Public Agency	County	Section Number
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The following Special Provision supplement the "Standard Specifications for Road and Bridge Construction", adopted January 1, 2022, the latest edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", and the "Manual of Test Procedures of Materials" in effect on the date of invitation of bids, and the Supplemental Specification and Recurring Special Provisions indicated on the Check Sheet included here in which apply to and govern the construction of the above named section, and in case of conflict with any parts, or parts of said Specifications, the said Special Provisions shall take precedence and shall govern.

The following documents are Special Provisions of this contract:

DIVISION 01 - GENERAL REQUIREMENTS
01 11 00 Summary of Work (2 pages)
01 26 00 Contract Modification Procedures (3 pages)
01 29 00 Payment Procedures (6 pages)
01 32 00 Construction Progress Documentation (8 pages)
01 33 00 Submittal Procedures (5 pages)
01 60 00 Product Requirements (3 pages)
01 62 00 Product Options and Substitutions (3 pages)
01 73 00 Execution (11 pages)
01 77 00 Project Closeout (4 pages)

DIVISION 02 – SITEWORK
02 41 00 Site Demolition (4 pages)

DIVISION 03 – CONCRETE
03 05 00 Common Work Results for Concrete (5 pages)
03 11 00 Concrete Forming (7 pages)
03 15 00 Concrete Accessories (4 pages)
03 20 00 Concrete Reinforcing (7 pages)
03 31 00 Structural Concrete (18 pages)
03 39 00 Concrete Curing (6 pages)

DIVISION 13 – SPECIAL STRUCTURES
13 50 00 Salt Storage Structure (10 pages)

DIVISION 31 – EARTHWORK
31 10 00 Site Clearing (3 pages)
31 22 13 Rough Grading (3 pages)
31 23 16 Excavation (5 pages)
31 23 23 Fill (7 pages)
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31 32 00 Soil Stabilization (4 pages)

DIVISION 32 – EXTERIOR IMPROVEMENTS
32 11 23 Aggregate Base Courses (3 pages)
32 12 16 Asphalt Paving (4 pages)
32 13 13 Concrete Paving (3 pages)
32 92 19 Seeding (6 pages)

DIVISION 33 - UTILITIES
33 40 00 Storm Drainage Utilities (4 pages)

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33 49 00 Storm Drainage Structures (4 pages)

DIVISION 34 - TRAFFIC
34 41 16 Traffic Control Equipment (3 pages)

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Work consists of constructing a new salt storage building, demolishing the existing salt dome foundation, regrading and paving.

1.02 CONTRACTS

A. All work for the project will be performed under a single General Contractor, including general mechanical, electrical, plumbing and site work, where basis of payment is a unified bid.

B. Work shall be performed under the direction of the Contractor. Certain items of work may be indicated to be "not-in-contract", “In future phase” or "by others". In these cases the Contractor shall coordinate with such other contractors or persons as the Owner may direct to achieve final installation or construction.

C. Unless otherwise indicated, the performance of all Work described in the Contract Documents shall be the responsibility of the Contractor.

1.03 PROJECT INFORMATION

A. Project location: 21308 IL Rt. 9, Tremont, Illinois 61568

B. Owner’s Representative:

1. Mr. Dan Parr: (309) 925-5532

1.04 PROJECT TIME SCHEDULE

A. Work of the project shall start within ten calendar days after issuance of a Notice to Proceed.

1.05 WORK SCHEDULING AND COORDINATION

A. The Contractor shall schedule all construction activities as required to achieve an orderly and expeditious prosecution of all work covered by the Contract Documents.

B. The Contractor, in cooperation with its subcontractors, shall prepare and adhere to a comprehensive Construction Schedule designed to complete the total project within the time specified in Article 1.4, and prepared in accordance with the

SPECIAL CONDITIONS.

C. Delivery hours for construction materials delivery shall occur after 7:00 A.M. and before 5:00 P.M. Monday through Friday, unless written exception is provided by the OWNER.

D. Construction activities shall not interfere with the public or traffic, local or through traffic, and other private operations, particularly during lunch time hours and rush hours. The portions of Post Road Park will be maintained in an “open for to the Public” mode, when not included in the Work or before construction activities being. The Contractor shall provide all appropriate signage to alert the public of access, entry restrictions and egress changes.

1.06 MANAGEMENT OF CONTRACTOR'S FORCES

A. The Contractor shall designate a superintendent who shall represent the Contractor on the jobsite. Directions given to this superintendent shall be as binding as if given to the Contractor

B. Manage, schedule and supervise the Work to meet the construction schedule.

C. Directions from the Owner to the Contractor will only be through the Engineer Contractor shall not accept direction from nor negotiate changes with the Owner.

END OF SECTION 01 11 00

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect / Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1. Work Change Proposal Requests issued by Architect / Engineer are not instructions either to stop work in progress or to execute the proposed change.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect / Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect / Engineer are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 15 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity

relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect / Engineer.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect / Engineer will issue a Change Order for signatures of Owner and Contractor.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect / Engineer may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 WORK CHANGE DIRECTIVE

A. Work Change Directive: Architect / Engineer may issue a Work Change Directive. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01 26 00 – Contract Modification Procedures
2. Section 01 32 00 – Construction Progress Documentation

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect / Engineer at earliest possible date, but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values coordinated with each element.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Owner's name.
    c. Owner's Project number.
    d. Name of Architect.

    e. Architect's Project number.
    f. Contractor's name and address.
    g. Date of submittal.

2. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:

    a. Related Specification Section or division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
        1) Labor.
        2) Materials.
        3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five (5) percent of the Contract Sum.
4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site.

5. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
6. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.

7. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect / Engineer and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

1. Submit draft copy of Application for Payment seven (7) days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect / Engineer and Owner. Submit forms for approval with initial submittal of schedule of values.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect / Engineer will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.

2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit one (1) signed and notarized original copy of each Application for Payment to Architect / Engineer which shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).

4. Products list (preliminary if not final).
5. Sustainable design action plans, including preliminary project materials cost data.
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

    a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took

possession of and assumed responsibility for corresponding elements of the Work.

10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

B. Related Requirements:

1 Section 01 33 00 – Submittal Procedures for submitting schedules and reports.
2. Section 01 40 00 – Quality Requirements for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup construction schedule.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity

description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at bi-weekly intervals.

H. Material Location Reports: Submit at bi-weekly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of discovery of differing conditions.

K. Unusual Event Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect’s / Engineer's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 – Project Management and Coordination. Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including work stages, interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review submittal requirements and procedures.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for Project closeout and Owner startup procedures.

9. Review and finalize list of construction activities to be included in schedule.
10. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontractors, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for the Notice of Award final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than twenty (20) days, unless specifically allowed by Architect / Engineer.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:

a. Securing of approvals and permits required for performance of the Work.
b. Temporary facilities.
c. Construction of mock-ups, prototypes and samples.
d. Owner interfaces and furnishing of items.
e. Regulatory agency approvals.
f. Punch list.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities in-

clude, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 – Submittal Procedures in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's / Engineer's administrative procedures necessary for certification of Substantial Completion.
5. Punch List and Final Completion: Include not more than fifteen (15) days for completion of punch list items and final completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 – Summary. Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 - Summary. Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordinate list below with work restrictions listed in Section 01 10 00 – Summary.
    b. Coordination with existing construction.
    c. Limitations of continued occupancies.
    d. Uninterruptible services.
    e. Partial occupancy before Substantial Completion.
    f. Use of premises restrictions.
    g. Provisions for future construction.
    h. Seasonal variations.
    i. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.

c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Inspections.
j. Adjusting.
k. Curing.
l. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide the following:

a. Structural completion.
b. Temporary enclosure of space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial completion.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one (1) day before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentages for each activity.

I. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

J. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1.8 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within fifteen (15) days of date established for the Notice of Award. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in ten (10) percent increments within time bar.

1.9 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.

7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.
17. Partial completions and occupancies.
18. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

C. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 2 – PRODUCTS (Not Used)

PART 3 – PRODUCTS (Not Used)

END OF SECTION 01 32 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish all labor, materials, equipment and services necessary or incidental to the completion of all submittals in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 62 00: Product Options and Substitutions
B. Sections of the specification applicable to the work included in this section.

1.03 WORK NOT INCLUDED

A. Submittals not required will not be reviewed by the ENGINEER.

B. The Contractor may require its subcontractors to provide drawings, setting diagrams and similar information to help coordinate the Work, but such data may be required for Envision and Project Goal Documentation but may not be reviewed by the ENGINEER for correctness or compliance with the design intent.

1.04 QUALITY ASSURANCE

A. Coordination of Submittals:

1. The Contractor shall promptly prepare a schedule for timely submittal and processing of shop drawings required by the Contract Documents. The schedule shall be distributed to the ENGINEER, the Owner and the subcontractors. This schedule shall list all required submittals by specification section number and shall indicate the week the submittal will occur. Schedule shall be submitted no later than ten days prior to the first application for payment.

2. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.

3. Verify that each item and the submittal for it conform in all respects with the specified requirements.

4. The General Contractor shall note deviations in the shop drawings from the Contract Documents, informing the ENGINEER in writing, or by markup of the shop drawings, of each deviation at the time of submission. The General Contractor shall inform the ENGINEER in writing or on

resubmitted shop drawings, of any revisions other than those requested by the ENGINEER on previous submittals.

5. The Contractor shall verify and coordinate all field dimensions before shop fabrication of materials, items, products or equipment.

6. By affixing the Contractor's signature and stamp to each submittal, certify that this coordination has been performed. Submittals not signed and stamped by the Contractor will be immediately returned, unreviewed, to the Contractor by the ENGINEER.

7. The ENGINEER shall notify the Contractor in writing if certain shop drawings must be held for correlation with shop drawings of related items.

8. Neither the Contractor nor the ENGINEER shall initiate changes to the Contract Documents by making corrections to the shop drawings.

B. Substitutions:

1. Substitutions will be considered as outlined in Section 01 62 00 - Product Options and Substitutions.

PART 2 - PRODUCTS

2.01 SHOP DRAWINGS

A. Scale and measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the work.

B. Types of prints required:

1. Submit Shop Drawings in the form of one digital copy, with all sheets included in one commonly read file, or four blackline prints of each sheet.

C. Review comments of the ENGINEER will be shown on the digital copy or blackline prints when it is returned to the Contractor. The Contractor may make and distribute such copies as are required for his purposes.

2.02 MANUFACTURER'S LITERATURE

A. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents is being submitted for review.

B. Submit the number of copies which are required to be returned, plus three copies

which will be retained by the ENGINEER and ENGINEER's consultants.2.3 SAMPLES

A. Provide sample or samples identical to the precise article proposed to be provided. Identify as described under "Identification of Submittals" below.

B. Number of samples required:

1. Unless otherwise specified, submit samples in the quantity, which is required to be returned, plus two, which will be retained by the ENGINEER.

2. By prearrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the ENGINEER. These cases are indicated in each technical specification.

2.04 COLORS AND PATTERNS

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

2.05 SPECIALTY PRODUCT INSTALLATION AND PERSONNEL

A. Project Personnel Experience (Specialized experience and technical competence). The Contractor shall demonstrate the relevant experience of key project personnel when indicated by the Technical Specifications through Preconstruction Submittals before commencing any portion of the Work.

1. Biographical data shall include the following:

a. Name of individual.
b. Company employed by.
c. Company position title.
d. Years with the company.
e. Position that the individual will hold in regard to this contract/project team, description of duties and what percentage of the individual's time would be committed to the project during the construction and establishment phases.
f. An indication of which other individuals submitted under Project Personnel Experience this individual has worked with and the project they worked on together.

2. Experience and Certification data shall include the following:

a. Describe work experience with projects that included technical and specialized material and product installations such as surfaces, drainage, soils, and plantings. Include the company (by name) they worked for when involved in the project.
b. An indication of which what the individuals responsibility was for the technical and specialized project, indicated above.
c. Describe job related educational experience including degrees, certificates etc. and granting institutions or certifying bodies.

PART 3 - EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS

A. Number all submittals with the Specification Section, and a transmittal number suffix, which proceed consecutively for each separate submittal.

1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.

2. On resubmittals, cite the original submittal number for reference.

B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.

C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal and section number in which the item was included.

D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the ENGINEER for his review upon request.

E. All submittals shall repeat the identification shown on the Contract Drawings and shall be identified by specification section number.

3.02 GROUPING OF SUBMITTALS

A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.

3.03 TIMING OF SUBMITTALS

A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible

revisions and resubmittals, and for placing orders and securing delivery.

B. In scheduling, allow ten working days for review by the ENGINEER following his receipt of the submittal.

3.04 ENGINEER'S REVIEW

A. Review by the ENGINEER does not relieve the Contractor from responsibility for errors, which may exist in the submitted data. The ENGINEER will not review quantities required.

B. Revisions:

1. Make revisions required by the ENGINEER.

2. If the Contractor considers any required revision to be a change, he shall notify the ENGINEER.

3. Make only those revisions directed or approved by the ENGINEER.

END OF SECTION 01 33 00

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SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Material and equipment incorporated into the work shall:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Engineer.

3. Manufacturer and fabricated products:

a) Design, fabricate and assemble in accord with the best engineering and shop practices.

b) Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

c) Two or more items of the same kind shall be identical, by the same manufacturer.

d) Products shall be suitable for service conditions.

e) Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

f) To the extent possible without impacting cost or schedule, products shall be manufactured in a location of regional proximity and with local sourced and or recycled materials as indicated in Section 01820: Envision and Sustainable Project Goals

g) To the extent possible without impacting cost or schedule, products shall be manufactured from recycled content and this content shall be documented as indicated in Section 01820: Envision and Sustainable Project Goals.

h) To the extent possible without impacting cost or schedule, products shall be provided by manufactures that employ sustainable, environmentally friendly, and/or responsible practices as indicated in Section 01820: Envision and

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Conditions and Special Conditions

B. Section 01 33 00: Submittal Procedures

C. Section 01 62 00: Product Options and Substitutions

D. Section 01 77 00: Project Closeout

1.03 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to ENGINEER.

1. Maintain one set of complete instructions at the jobsite during installation and until completion.

2. Maintain manufacturers Operations and Maintenance instructions and contact information until completion, at which point instructions will be submitted to Owner.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

2. Do not proceed with work without clear instructions.

C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.04 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accord with construction schedules and coordinate to avoid conflict with work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

3. To minimize waste generated on site, return packaging not recommended for storage and protection of materials after delivery to manufacturer.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.05 STORAGE AND PROTECTION

A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weathertight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Exterior Storage:

1. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

2. Store loose granular materials in a well-drained area on solid surfaces or utilizing other measures to prevent mixing with foreign matter.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

D. Protection After Installation:

1. Provide substantial coverings as necessary to protect installed products from damage due to traffic and subsequent construction operations. Remove when no longer needed.

END OF SECTION 01 60 00

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SECTION 01 62 00
PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes product options available to the Contractor and procedures for securing approval of proposed substitutions.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Conditions

B. Section 01 33 00: Submittal Procedures

C. Section 01 60 00: Product Requirements

1.03 PRODUCT OPTIONS

A. The Contract is based on standards of quality established in the Contract Documents.

1. In agreeing to the terms and conditions of the Contract, the Contractor accepts responsibility for verifying in advance that the specified products will be available; and agrees to place orders for all required materials in such a timely manner as is needed to meet his agreed construction schedule.

2. Neither the Owner nor the Engineer has agreed to the substitution of any materials or methods called for in the Contract Documents, except as they may specifically otherwise state in writing.

B. Where materials and/or methods are specified by naming one single manufacturer and/or model number, without stating that equal products will be considered, only the material and/or method so named is approved for incorporation into the work.

1. Should the Contractor demonstrate to the approval of the Engineer that a specified material or method, ordered in a timely manner, will not be available in time for incorporation into this work, the Contractor Shall propose substitute materials and/or methods to the Engineer with documentation sufficient to help the Engineer determine suitability of the proposed substitution.

C. Where materials and/or methods are specified by name and/or model number, followed by the words "or equal", "equal approved by the Engineer", "equal approved by Engineer prior to Bidding", or the like:

1. The material and/or method specified by name establishes the required standard of quality.

2. Materials and/or methods proposed by the Contractor to be used in lieu of materials and/or methods so specified by name shall in all ways equal or exceed the qualities of the named materials and/or methods.

3. Proposed substitutions shall be submitted for approval per the requirements of the General Conditions.

4. Do not assume that materials, equipment or methods proposed for substitution will be approved.

5. Material qualities and manufacturer methods associated with Envision and Sustainable Project Goals will be evaluated as part of the Engineer’s Approval.

6. Approval must be obtained in writing by the Engineer.

7. The decision of the Engineer shall be final.

D. The following products do not require further approval except for interface within the work:

1. Products specified by reference to standard specifications such as ASTM and similar standards.

2. Products specified by manufacturer's name and catalog model number.

1.04 REIMBURSEMENT OF ENGINEER'S COSTS

A. If substitutions, other than those meeting the conditions of Paragraph 1.3.B.1, are proposed to the Engineer after Contract award, the Engineer will record all time used by the Engineer and his consultants in evaluating each such proposed substitution.

B. The Engineer shall bill for reimbursement at a rate two and one-half times the direct cost for all time, plus 10 percent, for all costs related to evaluating the proposed substitution.

C. Upon receipt of the Engineer’s billing, the Contractor shall promptly reimburse the Engineer, whether or not the proposed substitution is approved.

END OF SECTION 01 62 00

SECTION 01 73 00
EXECUTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 01 10 00 – Summary of Work
2. Section 01 33 00 – Submittal Procedures
3. Section 01 77 00 – Project Closeout

1.03 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.04 INFORMATIONAL SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.05 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect / Engineer of locations and details of cutting and await directions from Architect / Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do no cut and patch structural elements in a manner that could change their load-carrying capacity of increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's / Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect / Engineer for the visual and functional performance of in-place materials.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine rough-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes and primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect / Engineer according to requirements in Section 01 31 00 – Project Management and Coordination.

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect / Engineer promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect / Engineer when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundation and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect / Engineer.

3.04 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, horizontal control points, and property corners on the plans.

B. Reference Points: Locate existing permanent benchmarks, horizontal control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect / Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect / Engineer before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect / Engineer.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project Site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 01 77 00 – Closeout Procedures for repairing or removing and replacing defective Work.

3.06 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

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

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 – Summary.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum

size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished areas into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional costs until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface or uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a watertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.07 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00 – Temporary Facilities and Controls.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.08 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 – Quality Requirements."

3.09 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 77 00
PROJECT CLOSEOUT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish all labor, materials, equipment and services necessary or incidental to the completion of all project closeout work in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. General Conditions and Special Conditions

PART 2 - EXECUTION

2.01 RECORD DOCUMENTS

A. The Contractor shall maintain at the site for the Owner one record copy of:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change Orders and other modifications to the contract
   5. Engineer's Field Orders or written instructions
   6. Approved Shop Drawings, Product Data and Samples

B. Maintenance of documents and samples:
   1. The Contractor shall store documents and samples in Contractor's field office apart from documents used for construction.
      a) Provide files and racks for storage of documents.
      b) Provide locked cabinets or secure storage space for storage of samples.
   2. The Contractor shall maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
   3. The Contractor shall make documents and samples available at all times for inspection by Engineer and Owner's representative.

C. Recording
   1. The Contractor shall label each document "PROJECT RECORD" in neat large printed letters.
   2. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
   3. Drawings: Legibly mark to record actual construction.
      a) Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

b) Field changes of dimension and detail.
c) Changes made by Field Order or by Change Order.
d) Details not on original Contract Drawings.

4. Specifications: Legibly mark to record actual installed material if the specified item has been substituted with a Mandatory Alternate as permitted by Section 01620 - Product Options and Substitutions.

D. Reproducible record drawings:

1. At the time of Substantial Completion, the Contractor shall provide a complete set digital files, in readily transmitted and readable format, made from the original Contract Drawings, including Engineering, structural, mechanical, fire protection and electrical drawings.
2. The Contractor shall carefully, accurately and completely transfer all markings, additions, deletions, and revisions from the Project Record Drawings to digital files, in readily transmitted and readable format, with each marking clearly distinguishable from the original information.
3. The Contractor shall label each digital reproducible media "PROJECT RECORD" with an Indication of discipline, systems, or scope contained in neat large printed letters, and date as of the Date of Substantial Completion.

E. Submittals

1. At Contract close-out, the Contractor shall deliver Record Documents, including digital reproducible files, to Engineer for the Owner.
2. Accompany submittal with transmittal letter in duplicate, containing:
   a) Date.
   b) Project title and number.
   c) Contractor's name and address.
   d) Title, file name, and number of each Record Document.
   e) Signature of Contractor or his authorized representative.
   f) Warranty Certificates and Manufacturer or Provider’s Contact info

2.02 OPERATIONS AND MAINTENANCE DATA

A. The Contractor shall provide media containing digital files, in readily transmitted and readable format, of all operating instructions and parts list for all operating general, mechanical, electrical, fire protection, and control equipment and other manufactured items.

1. The operating instructions shall integrate each piece of equipment in any one system into a numbered step-by-step sequence of operation.
2. The maintenance manuals shall include an exploded view and a parts list, with all component parts numbered, of each item of operating or expendable equipment.
3. Electrical manuals shall also contain an approved copy of each shop drawing.

B. Additional operating instruction and maintenance manuals' requirements are specified in their respective sections or divisions.

C. The Contractor shall include copies of all required manufacturer's or installers warranties.

D. Operating and maintenance data submittals shall be reviewed and accepted by the Engineer prior to processing final application for payment.

E. Each subcontractor shall train the maintenance personnel designated by the Owner in the operation and maintenance of all equipment installed by the subcontractor.

2.03 PUNCHLIST

A. The purpose of a punchlist is to assure the Owner and the Engineer that all incorrect work shall be corrected with reasonable promptness and in accordance with the Contract Documents and to provide an incentive to complete the work promptly to ensure prompt payment in full.

1. It is not the purpose of a punchlist to provide the Contractor with a 'work list' of items to be completed.
2. The work also includes submittals and documents for recording the Envision and Sustainable Project Goals for use in green rating certification and with future projects or work on site. It is an added purpose of the punchlist to ensure all installed products and materials are fully represented in the Documentation Notebook and submittal records.

B. The Contractor shall carefully check the work as it is being performed.

C. Unsatisfactory work shall be corrected immediately and not be permitted to remain and become a part of the punchlist.

D. Prior to, but no later than this Substantial Completion inspection, dates shall be established for equipment testing and instructional requirements not previously completed or agreed upon.

E. Following the Substantial Completion inspection and preparation of the punchlist, the Contractor shall meet with the Engineer to discuss what is required to before the Work can be accepted as complete. The Contractor shall respond promptly in completing the punchlist work.

F. The Engineer shall advise the Owner on the value of the Work not completed.

G. If the Owner, or a separate contractor installing Owner's equipment or furnishings, damages work which has been satisfactorily completed, the Owner bears the responsibility to repair such damaged work.

1. If the Owner wishes to have the Contractor repair such damaged Work or perform maintenance work not called for in the Contract, the Contractor shall be eligible for additional compensation for such work.

END OF SECTION 01 77 00

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SECTION 02 41 00
SITE DEMOLITION

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Demolition of structures, paving, and utilities.

B. Filling voids created as a result of removals or demolition.

1.02 RELATED WORK

A. Specified Elsewhere:

1. Section 31 23 16 – Excavation
2. Section 31 23 23 – Fill
3. Section 31 25 00 – Erosion and Sedimentation Control

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable State and local codes for demolition of structures, safety of adjacent structures, dust control, and runoff control.

B. Obtain required permits and licenses from appropriate authorities. Pay associated fees including disposal charges.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct public or private roadways, sidewalks, or fire hydrants without appropriate permits or written authorization.

E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.04 REFERENCES

A. Conform to the applicable portions of Sections 440 and 501 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

1.05 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped utilities and subsurface obstructions that will remain after demolition. Submit record as part of closeout submittals.

1.06 PROJECT CONDITIONS

A. Structures to be demolished will be discontinued in use and vacated prior to start of work.

B. Owner assumes no responsibility for condition of structures to be demolished.

C. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as reasonably practical. Variations within structures may occur by Owner's removal and salvage operations prior to start of demolition work.

D. Unless otherwise indicated in Contract Documents or specified by the Owner, items of salvageable value to Contractor shall be removed from site and structures. Storage or sale of removed items on site will not be permitted and shall not interfere with other work specified.

E. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Performance of required blasting shall comply with governing regulations.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. Fill material shall be as specified in Section 31 23 23.

PART 3 – EXECUTION

3.01 PREPARATION

A. Provide, erect, and maintain erosion control devices, temporary barriers, and security devices at locations indicated on Construction Drawings.

B. Protect existing landscaping materials, appurtenances, and structures, which are not to be demolished. Repair damage to existing items to remain caused by demolition operations.

C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary.

D. Mark location of utilities. Protect and maintain in safe and operable condition utilities that are to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities and Owner.

E. Notify adjacent property owners of work that may affect their property, potential noise, utility outages, or other disruptions. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property. Coordinate notice with Owner.

3.02 GENERAL DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent structures or pavements to remain.

B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed by authority.

C. Conduct operations with minimum of interference to public or private access. Maintain ingress and egress at all times as noted on the drawings.

D. Sprinkle work with water to minimize dust. Provide hoses and water connections for this purpose.

E. Comply with governing regulations pertaining to environmental protection.

F. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

3.03 DEMOLITION

A. Demolish site improvements designated to be removed as shown on the drawings. Site improvements shall include but not be limited to structures, retaining walls, foundations, pavements, curbs and gutters, drainage structures, utilities, signage or landscaping.

B. Disconnect and cap or remove utilities to be abandoned as shown on the drawings.

C. Remove structures, piping, and appurtenances as shown.

D. Demolish paving, curbs and remaining structures completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to Owner and authorities having jurisdiction.

E. Locate demolition equipment and remove materials to prevent excessive loading to supporting walls, floors, or framing.

F. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2-feet or more below proposed subgrade to permit moisture drainage. Remove slabs-on-grade and below grade construction within 2-feet of proposed subgrade.

3.04 FILLING VOIDS

A. Completely fill below grade areas and voids resulting from demolition or removal of structures, underground fuel storage tanks, wells, cisterns, etc., using aggregate fill materials consisting of stone, gravel, or sand free from debris, trash, frozen materials, roots, and other organic matter.

B. Areas to be filled shall be free of standing water, frost, frozen or unsuitable material, trash, and debris prior to fill placement.

C. Place fill materials in accordance with Section 31 23 23 unless subsequent excavation for new work is required.

D. Grade surface as shown on plans to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from site debris, rubbish, and other materials resulting from demolition operations. Leave areas of work in clean condition.

B. No burning of any material, debris, or trash on-site or off-site will be allowed, except when allowed by appropriate governing authority and Owner. If allowed as stated above, burning shall be performed in manner prescribed by governing authority. Attend burning materials until fires have burned out and have been completely extinguished.

C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to areas that are approved for disposal by governing authorities and appropriate property owners.

END OF SECTION 02 41 00

SECTION 03 05 00
COMMON WORK RESULTS FOR CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Temporary shoring of existing structure and pipes.
   2. Protection and finishing of concrete surfaces and reinforcement steel associated with concrete removal.
   3. Removal and satisfactory disposal of damaged, spalled, and unsound concrete foundations, walls, slabs, and/or existing pipe at locations shown in the plans and designated by the Engineer.
   4. Replacement of the removed material with new concrete and/or modified concrete patching material, including cleaning exposed reinforcing steel, drilling and grouting dowels for supporting and fastening additional reinforcement if needed, applying a chemical bonding agent; constructing the necessary form work, placing, consolidating and finishing the replacement concrete, forming joints and curing the repaired areas.

B. Related Sections:
   1. Section 01 33 00 – Submittal Procedures
   2. Section 01 45 00 – Quality Requirements
   3. Section 03 11 00 – Concrete Forming
   4. Section 03 20 00 – Concrete Reinforcing
   5. Section 03 31 00 – Structural Concrete
   6. Section 03 39 00 – Concrete Curing

C. References:
   1. ACI 301-16 – Specifications for Structural Concrete.
   2. ASTM C932 – Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
   3. ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
   4. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.

1.03 DEFINITIONS

A. (RESERVED)

1.04 SUBMITTALS

A. Submit under the provisions of Division 01 – Section 01 33 00 – Submittal Procedures.

B. Refer to Section 03 31 00 for product data, material certifications, design mixtures, and concrete mix properties required for submittal.

C. Product Data: Submit data on finishing materials

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

1. Maintain one copy of document on site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products in accordance with requirements set forth by the Engineer and product manufacturer.

B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 - PRODUCTS

1.07 EQUIPMENT

A. The equipment used shall be subject to approval of the Engineer.

1.08 CONCRETE MATERIALS

A. Refer to Section 03 31 00 for concrete materials.

1.09 ADMIXTURES

A. Refer to Section 03 31 00 for admixtures.

1.10 RELATED MATERIALS

A. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

1.11 REPAIR MATERIALS

A. Refer to Section 03 31 00 for repair materials.

1.12 CONCRETE MIX

A. Concrete mix for concrete repair shall be Mix Design A, as specified in Section 03 31 00, with a maximum coarse aggregate size of 1/2 inch.

1. Concrete mix for concrete repair shall include fiber reinforcement at a dosage rate of 1 Lb/C.Y., or as specified by manufacturer.

B. Contractor may elect to use manufactured repair material for repair areas that are less than 15 square feet. Manufactured repair material shall be from BASF, SIKA, or Engineer approved equal. All manufactured patching materials that the Contractor intends to use must be applied as recommended by the material manufacturer and submitted to the Engineer under the provisions of Section 01 33 00 of the Specifications for approval.

1.13 STEEL REINFORCEMENT

A. Refer to Section 03 20 00.

1.14 FIBER REINFORCEMENT

A. Refer to Section 03 20 00.

1.15 FINISHING MATERIALS

A. Concrete Repair Mortar: Trowel-grade, microsilica and ASTM 1059 latex-modified, cement-based, non-sag repair mortar.

PART 3 - EXECUTION

1.16 INSPECTION

A. The Engineer will identify the areas of unsound concrete to be removed. The depth of removal shall be to sound concrete as determined by the Engineer. The perimeter of the removal shall be saw-cut to a depth of 2" or to top of the existing reinforcing steel, whichever is less. Removal outside the areas authorized by the Engineer will not be measured for payment. Existing concrete shall be removed by methods approved by the Engineer.

1.17 PREPARATION

A. Concrete removal work shall not begin until prior construction sequences indicated on the drawings are completed.

B. The Contractor shall furnish all equipment, material and labor required to temporarily support existing structure and pipes.

C. Any temporary support systems necessary to complete the work shall be in place and accepted by the Engineer prior to excavation and concrete removal work.

1.18 PROTECTION

A. The Contractor shall furnish all equipment, material and labor required to protect concrete surfaces and reinforcement steel.

B. Concrete shall be removed in such a manner as to leave the remaining structure and all attached structures and equipment undamaged. Any damage to the remaining structure or attached structures or equipment shall be repaired by the Contractor as directed by the Engineer at the Contractor's expense.

C. The Contractor shall take precautions to prevent concrete removal debris from entering the plant process system.

1.19 REMOVAL

A. (RESERVED)

1.20 REPAIR AND PATCHING

A. (RESERVED)

1.21 FINISH

A. The Contractor shall furnish all equipment, material and labor required to finish concrete surfaces.

B. All newly exposed concrete surfaces, which are to receive new concrete or finish, shall be blast-cleaned.

C. Where concrete surfaces are not to receive new concrete, limits of concrete removal shall extend 1/2 inch beyond final dimensions. Surfaces shall then be built up with 1/2 inch concrete repair mortar to final dimensions.

D. Apply finish to concrete surfaces in accordance with material manufacturer's preparation and application recommendations.

1.22 DISPOSAL

A. The Contractor shall furnish all equipment and labor required to dispose of the removed concrete and reinforcement.

B. All concrete and non-salvaged reinforcement bars removed by the Contractor shall be disposed of off-site by the Contractor at the Contractor's expense in accordance with the Project Specifications.

C. Dispose of wastewater employed in cutting, washing, and rinsing of concrete surfaces in a manner such that the wastewater does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area.

END OF SECTION 03 05 00

SECTION 03 11 00
CONCRETE FORMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes concrete formwork, shoring, bracing, and anchoring for cast-in-place concrete as shown on the drawings and as herein specified for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.
   4. Elevated slabs.
   5. Concrete toppings.
   6. Building frame members.
   7. Building walls.
   8. Concrete sidewalks.
   9. Entrance slabs.
   10. Miscellaneous items requiring forms.

B. Related Sections:
   1. Section 01 33 00 – Submittal Procedures
   2. Section 03 15 00 – Concrete Accessories
   3. Section 03 20 00 – Concrete Reinforcing
   4. Section 03 31 00 – Structural Concrete
   5. Section 07 26 00 – Vapor Retarders

C. References:
   1. ACI 117-10 – Specification for Tolerances for Concrete Construction and Materials.
   2. ACI 301-16 – Specifications for Structural Concrete.
   3. AISC 303-10 – Code of Standard Practice for Steel Buildings and Bridges.
   4. ASTM D4397 – Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
   5. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

1.03 DEFINITIONS

A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.04 SUBMITTALS

A. Submit under the provisions of Division 01 - Section 01 33 00 – Submittal Procedures.

B. Product Data: For each type of product.

C. Formwork shop drawings: Prepared by or under the supervision of a licensed professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structures in accordance with ACI 301 if different than that shown on plans.

1. Location of construction joints is subject to approval of the Engineer.

E. Qualification Data: For installer and manufacturer of forms.

1.05 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver form materials in manufacturer's packaging with installation instructions.

B. Store off ground in ventilated and protected area to prevent deterioration from moisture or damage.

1.07 SYSTEM DESCRIPTION

A. Design and construct formwork, shoring and bracing such that resultant concrete conforms to shapes, lines, and dimensions shown in the contract documents.

PART 2 - PRODUCTS

1.08 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete:
   1. Provide continuous, true, and smooth concrete surfaces.
   2. Furnish in largest practicable sizes to minimize number of joints in formwork.
   3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03 31 00, and as follows:
      a. Plywood, metal, or other approved panel materials.
      b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
         i. Structural 1, B-B or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class.
   1. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

1.09 RELATED MATERIALS

A. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

B. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   1. Contractor shall verify compatibility of form release agent selected with coating specified here-in.
   2. Formulate form-release agent with rust inhibitor for steel form-facing materials.
   3. Products: Subject to compliance with requirements, provide one of the products specified.
      a. Dayton Superior Construction Chemicals - Magic Kote
      b. Lambert Corporation – Form Release Gold
      c. Euclid Chemical Co. – Formshield Pure
      d. Or Engineer approved equal.
   4. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

a. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
b. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
c. Ties shall be removed after forms are removed and holes shall then be filled with mortar that matches adjacent surface.
d. Provide stainless steel form ties for exterior surfaces exposed to view.

e. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

1.10 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

1.11 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static and dynamic loads, and construction loads that might be applied, until structure can support such loads. Load supporting formwork shall remain in place until concrete has reached 75% of specified minimum 28-day compressive strength.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Concrete surfaces exposed to view shall conform to Surface Finish 3.0. All other as-cast finishes shall conform to Surface Finish-2.0 as specified in ACI 301.

D. Construct forms tight enough to prevent loss of concrete mortar.
1. Minimize joints.
2. Exposed Concrete: Symmetrically align joints in forms.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
1. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.
2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyway, reglet, recesses, formwork, and other accessories, for easy removal.

F. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips.
2. Use strike-off templates or compacting-type screeds.

H. Chamfer exterior corners and edges of permanently exposed concrete as indicated on drawings.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Engineer prior to forming openings not indicated on Drawings.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement, anchoring devices and embedded items. Do not apply form release agent where concrete surfaces are scheduled to receive special finishes, which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

M. Earth forms, except for footings, not permitted.

N. Provide temporary ports in formwork to facilitate cleaning and inspection.
1. Locate openings at bottom of forms to allow flushing water to drain.
2. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

1.12 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Provide formed openings where required for work embedded in or passing through concrete.

B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts.

C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

D. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances of AISC 303.
3. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
4. Clean embedded items immediately prior to concrete placement.

1.13 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work.
   1. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces.
   2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
   1. Align and secure joints to avoid offsets.
   2. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

D. During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms, unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

1.14 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
   1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

END OF SECTION 03 11 00

SECTION 03 15 00
CONCRETE ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes concrete accessories as shown on the drawings and as herein specified, for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.
   4. Elevated slabs.
   5. Concrete toppings.
   6. Building frame members.
   7. Building walls.
   8. Concrete sidewalks.
   9. Entrance slabs.
   10. Miscellaneous concrete construction.

B. Related Sections:
   1. Section 01 33 00 – Submittal Procedures
   2. Section 03 11 00 – Concrete Forming
   3. Section 03 20 00 – Concrete Reinforcement
   4. Section 03 31 00 – Structural Concrete
   5. Division 5 – Metals
   6. Section 07 26 00 – Vapor Retarders

C. References:
   1. ACI 117-10 – Specification for Tolerances for Concrete Construction and Materials.
   2. ACI 301-16 – Specifications for Structural Concrete.
   3. AISC 303-10 – Code of Standard Practice for Steel Buildings and Bridges
   4. COE CRD-C 572 – Specification for Polyvinyl Chloride Waterstop.

1.03 DEFINITIONS

A. (RESERVED)

1.04 SUBMITTALS

A. Submit under the provisions of Division 01 - Section 01 33 00 – Submittal Procedures.

B. Product Data: For each type of product.

C. Samples: For all waterstops to be used.

D. Construction Joint Layout: Refer to Section 03 11 00.

E. Shop Drawings: Show fabrication of structural-steel components to be embedded in concrete.
   1. Include embedment drawings.
   2. Include type, size, and length of anchor rods.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's packaging with installation instructions.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

C. Store anchors and packaged materials to permit easy access for inspection and identification and protect from corrosion and deterioration.

1.06 COORDINATION

A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

1.07 WATERSTOPS

A. (RESERVED)

1.08 JOINTS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, 1/2 inch thick (unless shown otherwise).

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

1.09 ANCHORS

A. Unheaded Anchor Rods: ASTM F 1554, Grade 55.
   1. Configuration: As indicated on drawings.
   2. Nuts: ASTM A 563 hex carbon steel.
   3. Plate Washers: ASTM A 36 carbon steel.

4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153, Class C, unless noted otherwise.

B. Headed Anchor Rods: ASTM F 1554, Grade 55 straight.
1. Nuts: ASTM A 563 hex carbon steel.
2. Plate Washers: ASTM A 36 carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153, Class C unless otherwise noted.

PART 3 - EXECUTION

1.10 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Provide factory fabricated joints in waterstops. Butt-joints shall be field fabricated according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

1.11 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 2 inches into concrete.
3. Unless indicated differently on the Drawings, locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Unless indicated differently on the Drawings, locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls such that the ratio of the dimensions of the pour does not exceed 2:1, or as indicated on the Drawings. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas with a ratio of plan dimensions not greater than 2:1, or as indicated on the Drawings. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

1.12 ANCHORS AND OTHER EMBEDDED ACCESSORIES

A. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

B. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances of AISC 303.
3. Clean embedded items immediately prior to concrete placement.

END OF SECTION 03 15 00

SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes reinforcing steel bars, welded wire fabric and accessories for cast-in-place concrete.

B. Related Sections
1. Section 01 33 00 – Submittal Procedures.
2. Section 03 11 00 – Concrete Forming.
3. Section 03 31 00 – Structural Concrete.

C. Reference to Standards
1. ACI 117-10 – Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301-16 – Specifications for Structural Concrete.
3. ACI SP-066 - Detailing Manual.
4. ANSI/ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
5. ASTM A615 – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
6. ASTM A706 – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
7. ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
8. ASTM A884 – Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
9. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
10. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
11. ASTM D3963 – Standard Specification for Fabrication and Jobsite Handling of Epoxy Coated Steel Reinforcing Bars.
12. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
13. CRSI - Concrete Reinforcing Steel Institute - Manual of Standard Practice.

1.03 DEFINITIONS

A. (RESERVED)

1.04 SUBMITTALS

A. Submit under the provisions of Division 01 - Section 01 33 00 – Submittal Procedures.

B. Product Data: For the Following:
   1. Each type of steel reinforcement.
   2. Epoxy repair coating.
   3. Zinc repair material.
   4. Bar supports.
   5. Mechanical splice couplers.
   6. Structural thermal break insulated connection system.

C. Steel Reinforcement Shop Drawings:
   1. Placing drawings that detail fabrication, bending, and placement.
   2. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
   1. Location of construction joints is subject to approval of the Engineer.

E. Qualification Data: For installer and manufacturer of reinforcement.

F. Material Certificates: For each of the following, signed by manufacturers:
   1. Steel reinforcement and accessories.
   2. Fiber reinforcement.

G. Material Test Reports: For the following, from a qualified testing agency:
   1. Steel Reinforcement:
      a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706.
   2. Mechanical splice couplers.

H. Welder's Certificates: Submit under provisions Division 01 – General Requirements, Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI Manual of Standard Practice, ACI 117, and ACI 301.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."

C. Maintain one copy of each document on site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.

1.07 COORDINATION

A. Coordinate work under provisions of Division 01 – General Requirements.

B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 - PRODUCTS

1.08 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.

B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

C. Low-Alloy Steel Reinforcing Bars: ASTM A706, deformed.

D. Epoxy-Coated Reinforcing Bars:
   1. Steel Bars: ASTM A 615, Grade 60, deformed.
   2. Epoxy Coating: ASTM A 775 with less than 2 percent damaged coating in each 12-inch bar length.

E. Plain-Steel Welded Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.

F. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A coated, Type 1, plain steel.

1.09 REINFORCEMENT ACCESSORIES

A. Steel Tie Wire: ASTM A1064, annealed steel, Minimum 16 gage.

B. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

C. Epoxy-Coated Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, ASTM A 775 epoxy coated.

D. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM D 3963 and ASTM A775.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    a. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
    b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

1.10 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 117.

B. Locate reinforcing splices not indicated on drawings at point of minimum stress.

1.11 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: Monofilament or fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

1. Products: Subject to compliance with requirements, provide one of the products specified.
    a. Monofilament Micro-Fibers:
        i. Axim Italcementi Group, Inc.; Fibrasol II P.
        ii. Euclid Chemical Company (The), an RPM company; Fiberstrand 150.
        iii. FORTA Corporation; FORTA Econo-Mono.
        iv. Grace Construction Products, W. R. Grace & Co.; Grace MicroFiber.
        v. Metalcrete Industries; Polystrand 1000.
        vi. Nycon, Inc.; ProConM.
        vii. Propex Concrete Systems Corp.; Fibermesh 150.
        viii. Sika Corporation; Sika Fiber PPM.
        ix. Or Engineer approved equal.
    b. Fibrillated Micro-Fibers:
        i. Axim Italcementi Group, Inc.; Fibrasol F.
        ii. Euclid Chemical Company (The), an RPM company; Fiberstrand F.
        iii. FORTA Corporation; FORTA Econo-Net.
        iv. Grace Construction Products, W. R. Grace & Co.; Grace Fibers.
        v. Nycon, Inc.; ProConF.
        vi. Propex Concrete Systems Corp.; Fibermesh 300.
        vii. Sika Corporation; Sika Fiber PPF.
        viii. Or Engineer approved equal.

B. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1 to 2-1/4 inches long.

1. Products: Subject to compliance with requirements, provide one of the products specified.
   a. 3M; Scotchcast Polyolefin Fibers 1" or 2".
   b. Euclid Chemical Company (The), an RPM company; Tuf-Strand SF.
   c. FORTA Corporation; FORTA FERRO.
   d. Grace Construction Products, W. R. Grace & Co.; Strux 90/40.
   e. Nycon, Inc.; XL.
   f. Propex Concrete Systems Corp.; Fibermesh 650.
   g. Sika Corporation; Sika Fiber MS10.
   h. Or Engineer approved equal.

PART 3 - EXECUTION

1.12 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

1.13 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Accurately position, support, and secure reinforcement against displacement. Reinforcement shall be tied at a minimum of 50 percent of the bar intersections.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, no less than one bar diameter, or not less than 1 1/3 times the size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with Drawings.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one

mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

G. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

H. Accommodate placement of formed openings.

I. Wall reinforcement shall not be placed in the work until one side of the wall forms has been erected, aligned and braced. As the wall reinforcement is placed, it shall be secured to the wall form with the proper clearance between the steel and forms.

J. Slab reinforcement shall be supported by manufactured steel bolsters only. Concrete half-bricks may be permitted only in slab on grade or footing construction.

K. Where walls or other items are shown as built integrally with other sections, but are placed as separate pours, keys and dowels shall be provided. Dowels shall be same size and at same spacing as reinforcing, unless noted otherwise.

L. Provide 4 x 4 - W 4.0 x W 4.0 electrically welded wire fabric, ASTM A185 reinforcing in all concrete slabs on ground unless shown otherwise.

M. Provide corner bars of same size and spacing as main reinforcement at all intersections and corners, unless noted otherwise.

N. Where openings occur in walls or slabs, and unless otherwise noted on the plans, provide two (2) #5 bars at all sides and extending at least 2 feet beyond corners and two (2) #5 bars at least 4 feet long diagonally across each re-entrant corner.

O. The Contractor shall give 24 hour notice to the Engineer for inspection of the reinforcing prior to the placement of the concrete.

P. The reinforcing for the concrete placement shall be completed and inspected before ordering concrete.

1.14 INSTALLATION TOLERANCES

A. Comply with ACI 117.

1.15 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Division 01 – General Requirements.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.

3. Steel-reinforcement welding.

END OF SECTION 03 20 00

SECTION 03 31 00
STRUCTURAL CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. All cast-in-place concrete including, but not limited to floors, slabs on grade, foundation walls, supported slabs, beams and columns.
   2. Control, expansion, and contraction joint devices associated with concrete work.
   3. Equipment pads and manhole slabs.

B. Related Sections:
   1. Section 01 33 00 – Submittal Procedures
   2. Section 03 11 00 – Concrete Forming
   3. Section 03 15 00 – Concrete Accessories
   4. Section 03 20 00 – Concrete Reinforcing
   5. Section 03 39 00 – Concrete Curing
   6. Section 07 26 00 – Vapor Retarders
   7. Section 26 05 33 – Raceway and Boxes
   8. Section 31 23 00 – Excavation and Fill

C. References:
   1. ACI 117-10 – Specification for Tolerances for Concrete Construction and Materials
   2. ACI 301-16 – Specifications for Structural Concrete
   3. ACI 305.1-14 – Specification for Hot Weather Concreting
   4. ACI 306.1-90 – Standard Specification for Cold Weather Concreting
   5. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
   6. ASTM C33 – Standard Specification for Concrete Aggregates
   7. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
   8. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
   9. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
   10. ASTM C94 – Standard Specification for Ready-Mixed Concrete

11. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete
12. ASTM C150 – Standard Specification for Portland Cement
13. ASTM C157 – Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
14. ASTM C172 – Standard Practice of Sampling Freshly Mixed Concrete
15. ASTM C219 – Standard Terminology Relating to Hydraulic Cement
16. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
17. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
18. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
19. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
20. ASTM C845 – Standard Specification for Expansive Hydraulic Cement
21. ASTM C881 – Standard Specification for Epoxy-Resin Base Bonding Systems for Concrete
22. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars
23. ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
24. ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
25. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
26. ASTM C1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
27. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete
28. ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures
29. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
30. ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness
31. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
32. ASTM E1155 – Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.04 PREINSTALLATION MEETINGS

A. Pre-placement Conference: Conduct conference a minimum of 15 days prior to placement of concrete at project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Special concrete finish subcontractor
2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.05 SUBMITTALS

A. Submit under the provisions of Division 01 - Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit data for each type of product including, but not limited to, joint devices, attachment accessories, admixtures, form release agents and bonding agent.

C. Qualification Data: For Installer, Manufacturer, and Testing Agency.

D. Material Certifications: For each item listed, submit information indicated.

1. Coarse and Fine Aggregate
   a. Producer Name.
   b. Quarry Location.
   c. Contact Person and Phone Number.
   d. Material Test Reports: From a qualified testing agency, indicating compliance with requirements.
2. Cement
   a. Mill Test Report.
   b. Producer Name and Location.
3. Water
   a. Specify Potable Water Source.

E. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, use of additional admixtures, Project conditions, weather, test results, or other circumstances warrant adjustments. Design Mixtures shall be reviewed according to the provisions of ACI 301.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

F. Concrete Mix Properties:

1. Mix Design
   a. Cementitious Materials (Lbs./C.Y.)
   b. Fine Aggregate (Lbs./C.Y.)
   c. Coarse Aggregate (Lbs./C.Y.)
   d. Water (Lbs./C.Y.)
   e. Admixtures.
2. Slump.
3. Air Content.

G. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

H. Minutes of pre-placement conference.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301

1. Maintain one copy of document on site.

B. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
2. Engineer reserves the right to reject Manufacturer at any time and to require Contractor to obtain different supplier.

D. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.07 PROJECT RECORD DOCUMENTS

A. Contractor shall accurately record actual locations of embedded utilities and components which are concealed from view.

1.08 COORDINATION

A. Coordinate Work under provisions of Division 01 – General Requirements.

PART 2 - PRODUCTS

1.09 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type II. Supplement with the following:
      a. Expansive Cement: ASTM C845, Type K for use in Mix B only.
      b. Fly Ash: ASTM C 618, Class F.
      c. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   1. Maximum size of coarse aggregate shall be in accordance with guidelines listed below:

Max. Aggregate Size	Type of Structure
1/2 inch	Concrete Toppings and Concrete Repair
3/4 inch	Mud Slabs, Stairs and Steps, Columns, Beams, Elevated Slabs, Flowable Fill
1 inch	Grade Beams, Equipment Pads, Slabs on Grade, Interior and Exterior Tank Walls, All Other Structures
1-1/2 inch	Caissons, Piles and Piers, Footings

D. Fine Aggregate: ASTM C 33, Free of materials with deleterious reactivity to alkali in cement.

E. Water: ASTM C 94 and potable.

1.10 ADMIXTURES

A. When required or permitted, admixtures shall conform to requirements specified below. Use of one or more admixtures in concrete shall be approved by Engineer prior to its use at job site.

B. Air-Entraining Admixture: ASTM C 260.

C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494, Type A.
   2. Retarding Admixture: ASTM C 494, Type B.
   3. Accelerating Admixture: ASTM C 494, Type C.
   4. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
   5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
   6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
   7. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
   8. Shrinkage Reducing Admixture: ASTM C 494, Type S; Maximum Length Change, tested in accordance with ASTM C 157, of 0.030%.

D. Field Service: When requested, the Contractor shall arrange to have a qualified concrete technician employed by manufacturer be available to assist in proportioning concrete materials for optimum use, to advise on proper use of admixture and adjustment of concrete mix proportions to meet job site and climatic conditions.

1.11 FLOOR AND SLAB TREATMENTS

A. (Reserved)

1.12 LIQUID FLOOR TREATMENTS

A. (Reserved)

1.13 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, 1/2 inch thick (unless shown otherwise).

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Latex Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Sealant and Primer: As specified in Section 07 92 00 – Joint Sealants.

1.14 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than design f'c (psi) of concrete substrate at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than design f'c (psi) of concrete substrate at 28 days when tested according to ASTM C 109.

1.15 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.
   3. Ground Granulated Blast-Furnace Slag: 50 percent.
   4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
   5. Silica Fume: 10 percent.
   6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

1.16 CONCRETE MIXTURES FOR BUILDING AND TANK ELEMENTS

A. Mix Design A: Proportion normal-weight concrete mixture for all parts of Work as follows:
1. Minimum Compressive Strength: 2500 psi at 7 days, 4500 psi at 28 days
2. Maximum Water-Cementitious Materials Ratio: 0.42
3. Cementitious material: Type II required, fly ash optional
4. Slump: 4 inches; 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture
5. Air Content:

Max. Aggregate Size	Air Content (percent)
1/2 inch	7 ± 1.5
3/4 inch	6 ± 1.5
1 inch	6 ± 1.5
1-1/2 inch	5.5 ± 1.5

a. Interior floor slabs located indoors not subjected to exposure conditions shall not contain entrained air.

1.17 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
2. In addition to batch ticket information required by ASTM C 94, the following shall be provided:

a. Concrete Design Strength.
b. Type and amount of cement.
c. Class and amount of coal fly ash, or raw or calcined natural pozzolans, if present.
d. Class and amount of ground granulated blast furnace slag, if present.
e. Type and amount of silica fume, if present.
f. Type and amount of admixtures.
g. Type and amount of fiber reinforcement, if present.

h. Maximum size of aggregate.
i. Amount of water added at job site shall be noted on ticket. No water is to be added at job site unless acceptable to Engineer.

3. One copy of delivery ticket shall be furnished to Engineer at time truck arrives at job site.

PART 3 - EXECUTION

1.18 INSPECTION

A. Verify site conditions under provisions of Division 01 - General Requirements.

B. Verify requirements for concrete cover over reinforcement have been met.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed and positioned securely.

D. Verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

1.19 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink or epoxy grout, unless noted otherwise.

C. Contractor shall inform Engineer 24 hours in advance of any concrete pours, indicating location and size of pour by submitting completed pre-pour checklist.

1.20 CONCRETE PLACEMENT

A. Concrete shall be conveyed and placed in conformance with ACI 301. Contractor shall instruct laborers on proper vibration techniques required for each situation.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Delivery of mixed concrete shall be regulated so that there will not be an interruption of more than 20 minutes duration in placement of concrete. Engineer may waive these requirements if slump and temperature requirements are met without adding water.

D. At beginning of concrete placement, a spare vibrator shall be on job site in addition to vibrators to be used during placement.

E. If electrical power for equipment used in the concrete placement is provided by a portable electric generator, an additional back-up portable electric generator or an alternate reliable electrical source shall be available prior to and during the concrete placement.

F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints in accordance with Contract Documents. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints. Concrete placed in vertical forms shall be placed in lifts of not more than 2 feet which shall be kept practically level.
   2. Chutes shall extend as nearly as practicable to point of deposit. Concrete shall not be dropped more than 6 feet. For walls or column placements in excess of 6 feet vertical height, tremie shall be used in placing concrete. If reinforcing steel or formwork is such that tremie cannot be used, method of placement shall be approved by Engineer.
   3. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   4. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

G. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   2. Maintain reinforcement in position on chairs during concrete placement.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

H. Pumping Concrete: Comply with ACI 301 and as follows.
1. Selection of pipe diameter for pumping shall be such that smallest inside diameter is no less than 4 inches or 3 times nominal maximum size coarse aggregate, whichever is greater.
2. Pumping lines shall be lubricated with minimum of 1 cubic yard of grout prior to pumping regular mix through lines.
3. Contractor shall show sufficient evidence prior to use of pump that mix is pumpable. This shall be accomplished by submittal, in accordance with Specification Section 01 33 00, of a certification from supplier that mix has performed satisfactorily on previous jobs of similar nature or by performing full scale field test for pumpability with line height and other variables being identical (or nearly so) to that of actual placing conditions.

I. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

J. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.21 FINISHING FORMED SURFACES

A. Defects in new concrete such as rock pockets and tie holes shall be repaired when forms are removed. Grout used for repair shall contain a bonding admixture conforming to ASTM C1059, Type II. Use admixture according to manufacturer's written instructions. This shall be done for all surface finishes of formed concrete surfaces.
1. Snap-off form ties shall be removed to a point 1" beneath surface of concrete and resulting depression shall be carefully pointed with grout.

2. Removable form tie holes shall be plugged with X-Plug by Sika Greenstreak, or Engineer approved equal, and packed with grout.

B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched.

1. Apply to concrete surfaces to be covered by earth fill.

C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to exposed concrete surfaces and submerged surfaces.

D. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete surfaces indicated on plans:

1. Wet down the entire area and fill all air pockets, voids and other depressions with grout to produce a smooth dense surface free from pits and other irregularities. Thoroughly scrub into the wetted surface a mortar mixture consisting of 1 part well graded sand passing the No. 30 sieve, 1 part portland cement and a sufficient quantity of a bonding admixture (described previously) to produce a workable mixture. Scrubbing shall be accomplished by use of a rubber or wood float following by finishing with a cork float or a light brush. The resulting surface shall be true and uniform, with no discernible thickness of mortar on the surface.
2. Finish shall extend a minimum of one foot below final grade.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

F. Edges and corners of structures, which are exposed in the completed structures, shall be chamfered 3/4 inch, unless noted otherwise.

1.22 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 301 recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to be covered with fill material and surfaces to receive concrete toppings.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high

spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with built-up or membrane roofing.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view and to clarifier floor grout.

E. Broom Finish: In lieu of final troweling, apply a broom finish to exterior concrete slabs, sidewalks, platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

F. Edges and corners of structures, which are exposed in the completed structures, shall be chamfered 3/4 inch, unless noted otherwise. Edges of walks and slabs on grade shall be finished with an edging tool.

G. Walks and slabs on grade shall have contraction joints scored in the concrete to control cracking. The spacing of the scored joints shall be equal to the width of the walk or slab unless otherwise specified or noted on the plans.

1.23 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

1.24 JOINT FILLERS (RESERVED)

1.25 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when directed by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water and/or bonding agent for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
5. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding

agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

1.26 PLANT QUALITY CONTROL

A. Sufficient testing shall be done by the supplier to assure the quality and consistency of the mix produced. The field tests are not to be used as a gauge of this quality.

1.27 FIELD QUALITY CONTROL

A. Provide under provisions of Division 01 - General Requirements.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:
1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143; one test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31.
   a. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
   b. Where the Contractor intends to remove load supporting forms (when conditions permit), cast and field cure one set of four standard cylinder specimens for each composite sample. Field curing shall continue up to within four hours prior to laboratory testing. The Contractor shall be responsible for the safe field storage of the concrete cylinders during the field curing process.
6. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimen at 7 days and two specimens at 28 days. The fourth cylinder shall be held for testing as a check cylinder.
   a. A 28 day compressive-strength test shall be the average compressive strength of two specimens obtained from same composite sample.
7. Test results shall be submitted in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain:
   a. Project identification name and number
   b. Name of concrete testing and inspecting agency
   c. Date of concrete placement
   d. Date of compressive strength test
   e. Location of concrete batch in Work
   f. Design compressive strength at 28 days
   g. Mix design designation
   h. Slump of concrete
   i. Temperature of concrete at placement
   j. Percent air entrained
   k. Number of specimens tested
   l. Compressive breaking strength
   m. Type of break for both 7- and 28-day tests
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

a. If compressive strength requirements are not met, steps shall be taken to increase average of subsequent strength test results. Engineer shall have right to order a change in proportions of mix for remaining work. Engineer shall also have right to require conditions of temperature and moisture necessary to secure required strength.

b. If any strength test of laboratory-cured cylinders falls below specified compressive strength by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection or curing, steps shall be taken to assure that the load-carrying capacity of structure is not jeopardized.

c. If likelihood of low-strength concrete is confirmed and computations indicate that load-carrying capacity may have been significantly reduced, tests of cores drilled from area in question may be required in accordance with ASTM C 42. In such cases, three cores shall be taken for each strength test more than 500 psi below specified compressive strength. If concrete in structure will be dry under service condition, cores shall be air dried (temperature 60° to 80° F., relative humidity less than 60%) for 7 days before test and shall be tested dry. If concrete in structure will be more than superficially wet under service conditions, cores shall be immersed in water for at least 40 hours and be tested wet.

d. Concrete in an area represented by core tests shall be considered structurally adequate if average of three cores is equal to at least 85% of specified compressive strength and if no single core is less than 75% of specified compressive strength. To check testing accuracy, locations represented by erratic core strengths may be retested.

e. If criteria of paragraph (d) are not met, and if structural adequacy remains in doubt, the Engineer may order load tests as outlined in ACI 318 for questionable portion of structure or require other appropriate action.

f. All costs associated with performing analytical investigations, core testing and load testing shall be paid for by Contractor.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

1.28 WATERTIGHTNESS

A. (RESERVED)

END OF SECTION 03 31 00

SECTION 03 39 00
CONCRETE CURING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this Section.

1.02 SUMMARY

A. Section includes initial and final curing, sealing of vertical foundation wall surfaces and exterior concrete flat work and curing, sealing and dust proofing of interior concrete floor slab surfaces.

B. Related Sections:
1. Section 01 33 00 – Submittal Procedures
2. Section 03 31 00 – Structural Concrete

C. References:
1. AASHTO M182 – Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.
2. ACI 301-16 – Specifications for Structural Concrete.
3. ACI 305.1-14 – Specification for Hot Weather Concreting.
4. ACI 306.1-90 – Standard Specification for Cold Weather Concreting.
5. ACI 308.1-11 – Standard Specification for Curing Concrete.
6. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
7. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
8. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
9. ASTM D2103 – Standard Specification for Polyethylene Film and Sheeting.

1.03 DEFINITIONS

A. (RESERVED)

1.04 SUBMITTALS

A. Submit under the provisions of Division 01 - Section 01 33 00 – Submittal Procedures.

B. Product Data: Provide data on curing compounds, including compatibilities and limitations.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301, ACI 305.1, ACI 306.1 and ACI 308.1.
   1. Maintain one copy of each document on site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products under provisions of Division 01 - General Requirements.

B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 - PRODUCTS

1.07 EVAPORATION RETARDER:

A. Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Products: Subject to compliance with requirements, provide one of the products specified:
   1. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
   2. BASF Construction Chemicals - Building Systems; Confilm.
   3. ChemMasters; SprayFilm.
   4. Conspec by Dayton Superior; Aquafilm.
   5. Dayton Superior Corporation; Sure Film (J-74).
   6. Edoco by Dayton Superior; BurkeFilm.
   7. Euclid Chemical Company (The), an RPM company; Eucobar.
   8. Kaufman Products, Inc.; Vapor-Aid.
   9. Lambert Corporation; LAMBCO Skin.
   10. L&M Construction Chemicals, Inc.; E-CON.
   11. Meadows, W. R., Inc.; EVAPRE.
   12. Metalcrete Industries; Waterhold.
   13. Nox-Crete Products Group; MONOFILM.
   14. Sika Corporation; SikaFilm.
   15. SpecChem, LLC; Spec Film.
   16. Symons by Dayton Superior; Finishing Aid.
   17. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
   18. Unitex; PRO-FILM.
   19. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.
   20. Or Engineer approved equal.

1.08 ABSORPTIVE COVER:

A. AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

1.09 MOISTURE-RETAINING COVER:

A. ASTM C171, polyethylene film or white burlap-polyethylene sheet.

1.10 WATER:

A. ASTM C94 and potable.

B. Engineer approved equal.

1.11 CLEAR, WATERBORNE, MEMBRANE-FORMING CURING COMPOUND

A. ASTM C309, Type 1, Class B, dissipating
   1. Euclid Chemical Company – Kurez DR-100
   2. Dayton Superior – Clear Resin Cure J11W
   3. BASF – MasterKure 181

1.12 CLEAR, SOLVENT-BORNE, MEMBRANE-FORMING CURING AND SEALING COMPOUND:

A. ASTM C1315, Type 1, Class A.

B. Products: Subject to compliance with requirements, provide one of the products specified.
   1. BASF Construction Chemicals - Building Systems; Kure-N-Seal 25 LV.
   2. ChemMasters; Spray-Cure & Seal Plus.
   3. Conspec by Dayton Superior; Sealcure 1315.
   4. Dayton Superior Corporation; Day-Chem Cure and Seal (J-22UV).
   5. Edoco by Dayton Superior; Cureseal 1315.
   6. Euclid Chemical Company (The), an RPM company; Super Diamond Clear; LusterSeal 300.
   7. Kaufman Products, Inc.; Sure Cure 25.
   8. Lambert Corporation; UV Super Seal.
   9. L&M Construction Chemicals, Inc.; Lumiseal Plus.
   10. Meadows, W. R., Inc.; CS-309/30.
   11. Metalcrete Industries; Seal N Kure 30.
   12. Right Pointe; Right Sheen 30.
   13. Vexcon Chemicals, Inc.; Certi-Vex AC 1315.
   14. Or Engineer approved equal.

C. COATING SCHEDULE
   1. Exterior & Interior Concrete Foundation Walls: One coat application
   2. Exterior Concrete Flatwork: One coat application
   3. Interior Concrete Floor Slabs: Two coat application

PART 3 - EXECUTION

1.13 INSPECTION

A. Verify substrate conditions under provisions of Division 01 - General Requirements.

B. Verify that substrate surfaces are ready to be cured.

1.14 CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft./hour before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing and Sealing Compound: Apply uniformly to surfaces indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat where indicated. Maintain continuity of coating and repair damage during curing period.

F. Cold Weather Concreting and Curing: Placing and protection of concrete shall be in conformance with ACI 306.1 and shall meet approval of Engineer prior to its use.

1. Contractor shall maintain temperature records of concrete. When concrete is placed, the time, date, weather conditions, outside air temperature and temperature of concrete shall be recorded. Temperatures shall be recorded at several locations (or as directed by Engineer) within enclosures and on concrete surfaces, edges and corners to obtain the range of temperatures. The maximum and minimum temperatures in each 24-hour period shall be recorded using measuring devices embedded in concrete surface or by placing thermometer against surface under temporary cover of thick insulation until a constant temperature is registered.

G. Hot Weather Concreting and Curing: Placing and protection of concrete shall be in conformance with ACI 305.1 and shall meet approval of Engineer prior to its use.

1. Contractor shall conform to ACI 305.1 when following conditions exist:
   a. Any combination of high air temperature, low relative humidity and high wind velocity.
   b. Any combination of rising air temperature and falling relative humidity.
2. Under hot weather conditions, Contractor shall be responsible for making arrangements for installation of windbreaks, shading, fog spraying, sprinkling, ponding or wet covering of light color. Arrangements shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

1.15 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions Division 01 - General Requirements.

B. Do not permit traffic over unprotected floor surface.

1.16 FINAL ACCEPTANCE OF COMPLETE WORK

A. The work shall be complete in every detail and the finished work approved by the Architect / Engineer and Owner before final acceptance.

END OF SECTION 03 39 00

SECTION 13 50 00
SALT STORAGE STRUCTURE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, the Construction Contract, including all Exhibits and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION

A. Provide design and construction for a permanent rectangular shape tension membrane covered truss type building. The structure shall meet or exceed the performance criteria of this specification.

B. Tazewell County, (here after, "The County") has evaluated different styles of Fabric Structures and has determined that this published specification is best suited for the county's needs in terms of quality and features. This specification shall not be interpreted as restrictive but rather as a measure of quality and performance against which all other Fabric Structures will be compared.

C. In comparing proposals, comparison will not be confined to price only. The successful proposer will be one whose product is judged as best serving the interests of the county by way of product, quality, delivery, and price. The county also reserves the right to reject any or all proposals or any part thereof, and to waive any minor technicalities. A contract will be awarded to the proposer submitting the best responsible proposal meeting the product requirements.

D. The specification herein states the minimum requirements of the county. All proposals must be regular in every respect. Unauthorized conditions, limitations, or provisions shall be cause for rejection. The county will consider as irregular or non-responsive any and all proposals that are not prepared and submitted in accordance with the proposal document and specification, or any proposal lacking sufficient technical literature to enable the county to make a reasonable determination of compliance to the specification. It shall be the proposer's responsibility to carefully examine each item of the specification. Failure to offer a a completed proposal or failure to respond to each section of the technical specification will cause the proposal to be rejected without review as non-responsive. All variances, exceptions and/or deviations shall be fully described. Deceit in responding to the specification will be cause for rejection.

1.03 INTENT OF SPECIFICATION

A. This specification covers the design, manufacture, shipping, handling and erection of a prefabricated membrane covered structure.

B. The specification as heretofore set forth is general in nature and scope and shall not be construed as to limit the work other than the requirement that the new re-locatable building shall match the specifications in materials, appearance, configuration and details.

C. It is the intent of this specification that the bidder shall include all labor, materials, equipment services and transportation to locate the building on the site designated with all other work.

D. Buildings shall be complete and operating and shall include all exterior and interior materials and systems as shown or indicated in contract documents.

E. All workmen shall be skilled and qualified for the work they perform. All material used, unless otherwise specified, shall be new and of the types and grades specified. The contractor shall certify that no asbestos containing materials that exceed Federal mandated safe asbestos levels have been used in the construction of the membrane covered structure.

F. Work shall be performed as necessary and required for the construction of the project as indicated. Such work includes the supply and installation of a membrane-covered structure complete with exterior and interior finishes. The building shall be as dimensioned with all features and quantities as per specification.

1.04 APPROVAL OF PLANS

A. <u>Upon award of this contract, the contractor shall furnish detailed drawings for all structural work stamped by a Structural Engineer licensed in the State of Illinois to verify compliance to local building code.</u>

B. All work to be performed under the conditions of this specification shall comply with the rules and regulations of all agencies having jurisdiction for this classification of construction and design and shall conform to the applicable live loads due to wind, rain and snow.

C. <u>Manufacturer 's Qualification</u>: The fabricator of the building or building components shall be regularly engaged in the fabrication of this type of building. They must meet the requirements of this Section and shall show evidence of having an adequate manufacturing facility, equipment, and a quality control system. The fabricator must provide evidence upon request that they have produced a minimum of 50 such structures in the previous 12 months before acceptance of this contract. A reference list of 5 salt buildings shall be provided upon request. The fabricator shall be subject to the Director's approval.

D. <u>Fabric Warranty</u>: All membranes used are to be North American made, water and mildew resistant, insect proof, and UV stabilized. They are to withstand extreme climatic variations and contain ultra-violet inhibitors to reduce degradation by the sun’s rays. Manufacturer is to provide a minimum 20-year pro-rata warranty on non-fire rated fabric and a 15- year pro-rata warranty on fire rated fabric according to the standard manufacturer’s warranty.

E. Steel Truss Warranty: Truss Framework tubing must be Hot Dip Galvanized inside and out of tubing - completely **after fabrication**. Failure to provide proof of this will cause the bid to be denied. The manufacturer is to provide a minimum 20-year pro-rata warranty on the trusses according to the standard manufacturer's warranty.
F. Building Erectors: The building erector shall be regularly engaged in the erection of fabric *covered* buildings, meeting the requirements of this Section. The erectors must provide evidence that they have constructed a minimum of 5 such structures in a US Municipal contract setting in the past 12 months before acceptance of this contract. The erectors shall be subject to the approval of the Director.

G. Building Erector: Crew supervisor shall provide **10-Hour OSHA Card** prior to work commencement. All workers on site shall provide and all applicable equipment operator certifications prior to work commencement.

1.05 WORKMANSHIP

A. The workmanship of all materials and components of the structure shall be commensurate with the functional requirements of the item
B. Building manufacturer shall fabricate such structure to include the membrane under factory conditions in a plant specifically arranged for this type of work. Fabricator shall provide adequate space, equipment, personnel and technical ability to coordinate the assembly and factory prefabrication of all major components of the work and all necessary operations in the packing, shipping and installation procedures. No fabrication shall be done until the materials have been tested and approved.
C. Welding: Truss fabricator must be an approved welding fabricator to standards listed herein. A copy of AWS certification must accompany the structural drawings upon request.
D. On site welding: If welding is required on site, no welding shall commence until the AWS welding inspector has inspected and approved the materials, joint preparation, equipment and qualifications of the welders in accordance with the standards herein.

1.06 SCOPE OF WORK

A. Provide design and construction for a permanent rectangular shape tension membrane covered truss type building. The structure shall meet or exceed the performance criteria of this specification.

    a. Building shall be mounted on CIP concrete foundation with an overall footprint of approximately 80 feet wide and 98 feet long minimum, 3-sided
    b. Truss spacing shall be 14 feet on center common
    c. One end fully enclosed with (2ea) 3' x 3' passive vents minimum. Fabric wall and steel framework complete
    d. One end open
    e. Fabric terminated to top of the concrete foundation – tensioning equipment shall be mounted on exterior of bunker wall.

f. Paving by others
g. Hot Dipped Galvanized Anchor bolts by contractor

B. Building design to be stamped by an engineer certified by the state where the project is located to verify compliance to local building code and installed by contractor
C. Delivery of all materials to site by contractor
D. All lifts and equipment for installation of all items by contractor
E. Complete Structure & Accessory installation by contractor

PART 2 - PRODUCTS

2.01 GENERAL DESIGN REQUIREMENTS

A. The membrane shall be tensioned over the framework. The structure shall be rectangular in shape with one enclosed and one open end wall. The interior of the structure below the main trusses shall be clear span free of any structural support members and shall provide unobstructed floor space. No exterior purlins, guy ropes or cables shall be used for anchoring the structure.

2.02 DESIGN REQUIREMENTS – STRUCTURAL FRAME

A. Structure shall be engineered so it is capable of withstanding the loads specified in ASCE 7-16, and the IBC 2021 code year edition without failure or damage. Design must incorporate both balanced and unbalanced loads. Additional rain on snow surcharge loading must also be added to gable shaped (non arch) buildings per ASCE 7-16.

B. The main structure shall consist of a welded truss arches comprised of parallel tubes separated apart by tubular webs. The truss cords must be made from round tubular steel with a continuous round tubular web separating the inner and outer chords. Exact chord and tubular web diameter and gauge to be called out by the manufactures engineering requirements provided they meet or exceed the below minimum mandates. Chord plastification calculations must be included on the structural drawings when chords are made with lighter than 10ga. Steel.

a. Meet or exceed the following design dimensions for open web chord truss:
   i. Truss Weight: 1300 lbs. minimum
   ii. Truss Chord Depth: 24” minimum
   iii. Chords Diameter 2.875” minimum
   iv. Chords Wall 10 ga. minimum
   v. Web Size 1.125” minimum
   vi. Web Wall 14 ga. minimum
   vii. Truss spacing 14’ o.c. mandatory

C. Structure must be capable of maintaining structural integrity in the event of a tear propagating in the fabric, without endangering occupants.

D. Truss framework tubing shall be Hot Dipped Galvanized after fabrication as per Building Product requirements stated herein. The Hot Dip Galvanizing must meet ASTM 123-12 as per the building code. Acceptable products:

   a. Hot Dip Galvanized Product, galvanized inside and out after fabrication is completed
   b. Aluminum

E. All purlins used in the building must be a minimum of 2-7/8" inches in diameter, 14ga min, made from one single piece of pipe, and be attached to the truss using a double bolted configuration with 2-5/8" bolts minimum attached directly to the welding dog bone or kingpin of the truss on each end. Saddle brackets are not suitable attachment as they allow rotational movement to occur. Purlins must be hot dipped galvanized – inline galvanizing, Gatorshield or Triple Coat are not acceptable. Cross "X" purlins will not be accepted as they tend to hold snow due to how they mount to the truss at the top chord.

F. Building must utilize cross cables in each end bay to prevent racking. Cables must be a minimum of 5/16" galvanized that is 7 by 19 commercial grade and must be secured to structural welded truss member using a solid bolted or clevis connection and they must be adjustable for proper tensioning with a galvanized, lockable turnbuckle. Cable assemblies attached with open hooks or loops will not be allowed. Cables are to be assembled using a press swedged connection, clamps will not be allowed as the can slide. Cables must terminate at every bay to prevent the removal of galvanizing at wear points causing rust.

G. All tie down pipe that is used to fasten the cover to the building must be secured by a 10,000-pound lashing winch at every truss located on the outside of the structure. This ensures the attachment hardware will not be exposed to the corrosive salt material diminishing the useful life of the hardware. Ratchet strap attachment to the tie down pipe will not be accepted as a main cover tensioning system. Tension pipe used for the main cover shall be oval or rectangular and installed in a vertical manner to minimize deflection when bay spacing exceeds 12' on center.

H. All bearing plates and other structural members must be hot dipped galvanized "POST" fabrication, no welding shall take place after the galvanized coating is applied. All anchor bolts, bolts and washers etc., shall be Hot Dip Galvanized.

2.03 ENGINEERING DESIGN CRITERIA

A.	IBC 2018	ASCE 7 - 16
B.	SNOW LOAD	20 PSF ground snow load
C.	COLLATERAL LOAD	0.25 pounds per square foot projected over entire roof
D.	WIND LOAD	105 V-ult

E.	OCCUPANCY CATEGORY	CAT I – Low Human Occupancy
F.	EXPOSURE CATEGORY	C
G.	RAINFALL	4” per hour, for at least 2 hours
H.	USE GROUP	S-2
I.	CONSTRUCTION TYPE	II-B
J.	FLAMMABILITY	ASTM E84
K.	WIND IMPORTANCE FACTOR	1.0
L.	SNOW IMPORTANCE FACTOR	0.8
M.	Seismic Design Category	B

D=Dead Load + Collateral Load
S=Symmetrical Snow or Live Load (Balanced or Unbalanced)
Ws = Wind Internal Suction
Wp = Wind With Internal Pressure
E = Earthquake

2.04 Structure shall be capable of being assembled, operated and dismantled in all ambient temperatures between -20F and 120F

2.05 Membrane Performance Minimum Standards

A.	Coated Weight	12 oz/yd (407 gsm)+/-5%
B.	Coating Thickness	4 mils average, each side +/-2%
C.	Finished Thickness	23 mils (ASTM D1777)
D.	Grab Tensile Strength, lbs	345 lbs Weft (ASTM -D5304) 370 lbs Warp (ASTM -D5035)
E.	Tongue Tear Strength, lbs	100 lbs Weft (ASTM -D2261) 110 lbs Warp (ASTM -D2261)
F.	Mullen Burst	650 psi (4428 kPa)
G.	Cold Crack Resistance	-55oC (ASTM –D2136)
H.	Resistance to UV & Weathering	90% retention after 2000 hr.
I.	Low Temperature Bend	-60 Degrees Celcius ASTM D2136
J.	FR Performance	ASTM E84

2.06 The stressed membrane structure must be designed to shed snow before the design load is exceeded, or alternatively provide structural capacity to meet or exceed required roof snow load requirements of specified site. The architectural membrane shall be continuous from the base of the structure to the peak and manufactured in such a way that no eave will exist.

A. To reduce premature wear points, at no time may the fabric be in contact with the steel truss arch.

2.07 Membrane used in the building design shall be designed to withstand the corrosive UV light according to the manufacturer warranty.

2.08 Base tensioning system: The membrane cladding will be provided with a mechanical tensioning system that allows the membrane to be fully tensioned around the structure perimeter each panel. The system will be designed such that the membrane can be tightly and neatly secured over the structural frame and that the system has a remaining range of adjustment.

2.09 Converting raw fabric to finished membrane cover; To ensure quality control:

A. Raw fabric converted to finished product must be manufactured on the same site as steel trusses and under the same supervision for complete building package continuity and quality control.
B. Conversion plant/personnel must be CSA S367 Certified.
C. Produce documented evidence that fabricator personnel have been trained no less than 160 hours in practical application.
D. Fabric welding and construction of fabric covers shall be completed in a dedicated production plant, with the floor heated to 70 degrees Fahrenheit (+/- 2 degrees), and full environmental controls via HVAC system throughout the plant.
E. Fabric conversion systems will include “inline vision systems” for 100% testing of weld parameters, continuously monitoring weld temperatures throughout the entire process. “Spot checking” will not acceptable practice.
F. Fabric Panels using keder connection to truss MUST have a 2” weld – no exceptions.
G. In-house testing of raw fabric and new welds shall be completed daily using a 4 hour test utilizing certified Instron Lab Equipment as described below in the chart:

Fabric Testing Requirements Per CSA S367-12 & ASTM D4851-07

Test Type	Test Speed (in/min)	Test Length (between jaws)	Limits (min)	Notes
Weld Adhesion Warp (Peel)	2"	4" separation	5 lbs/in	Sample strip to be 1" x 8", strip fabric down from 1 layer to a distance of 2" prior to testing. Must specify failure mode.(CAF)
Weld Adhesion Weft (Peel)	2"	4" separation	5 lbs/in	
Shear Strength Warp (Breaking Force/Tensile)	2"	3"	216 lbf/in	Limits are 90% of coated fabric from manufacturer. Test specimens to be long enough to extrude 1/2" through bottom and top clamps
Shear Strength Weft (Breaking Force/Tensile)	2"	3"	189 lbf/in	
Static Load Test	200% of max. design service load	4 hrs	60 lbs/in	To be tested at 20C, results to be reported as % elongation

2.10 METAL SPECIFICATIONS

A. All steel tubing used in the structure must have the following minimum structural and mechanical properties (ASTM A-500):
   a. Tube: ASTM A500/CSA G-40.21 (350W) Tensile 61,600 PSI Yield 45,700 PSI
   b. Plate: ASTM A500/Gr 50 CSA G40.21-50W Tensile 65,000 PSI Yield 50,000 PSI

B. All steel flat bar, truss components shall be fabricated and hot dipped galvanized post fabrication to ASTM A123-12 meeting ASTM Standard B6 zinc coatings.

PART 3 - EXECUTION

3.01 REFERENCES AND STANDARDS

A. Except where more stringent requirements are specified, comply with the applicable requirements of the following organizations and standards, for products, materials, and construction methods:

1. American Institute of Steel Construction (AISC)
2. American Iron and Steel Institute (AISI)
3. American Society of Civil Engineers (ASCE 7-10 Minimum Design Loads for Buildings and Other Structures)
4. American Welding Society (AWS)

B. The following publications are for the standards listed below but referred to thereafter by basic letter designation only. They form a part of this specification to the extent referenced thereto: American Institute of Steel Construction (AISC):

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.
2. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.
3. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
6. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.
7. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2010a.
8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
9. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 or CWB Canadian Welding Bureau.
10. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; National Fire Protection Association; 2010.
11. SSPC-SP 6 - Commercial Blast Cleaning; Society for Protective Coatings; 2007.
12. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
13. SSPC-Paint 22 - Epoxy-Polyamide Paints (Primer, Intermediate, and Topcoat); Society for Protective Coatings; 1982 (Ed.2004).

3.02 PAINTING

A. Painting of steel components shall only be utilized if necessary for field repairs and shall not be employed as a factory finish. Should field repair be necessary, a zinc rich field coat shall be used.

3.03 FIELD WELDING

A. In-Field fabric welding is accepted as a standard method of joining panels, rounding corners, repairing minor cuts or abrasions**.**

3.04 COLORS

A. As selected by the Director's Representative from standard Manufacturer's Color charts.

3.05 ADJUSTING

A. Repair cut, welded, and/or abraded galvanized surfaces with a minimum 2 mil thick coating of cold galvanizing compound (containing 93 percent zinc) applied in accordance with manufacturer's instructions.

3.06 APPROVED MANUFACTURERS:

A. **The following manufacturers are preapproved and meets or exceeds this Specification.**

Britespan Building Systems Inc.
688 Josephine Street North, RR#1
Wingham, Ontario N0G 2W0
Phone No. 1-800–407–5846

Rubb USA
1 Rubb Lane
Sanford, ME 04073
Phone No. 1-207-324-2877

Big Top Manufacturing
3255 US-19
Perry, FL 32347
Phone No. 1-850-584-7786

1. Equal manufacturer must be approved by director 7 days prior to bid opening.
2. Bidder must note manufacturer of structure at time of bid and may not be changed after.

3.07 FINAL ACCEPTANCE OF COMPLETE WORK

A. The work shall be complete in every detail and the finished work approved by the Engineer and Owner before final acceptance.

END OF SECTION 13 50 00

SECTION 31 10 00
SITE CLEARING

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Clear site of plant life and grass.

B. Remove:

1. Trees and shrubs where indicated.
2. Root system of trees and shrubs.
3. Surface debris.
4. Vegetation.

C. Perform clearing and grubbing operations.

D. Protect benchmarks; repair damage to all areas outside contract limits to match specified new work.

1.02 RELATED WORK

A. Specified Elsewhere:

1. Section 02 41 00 – Site Demolition
2. Section 31 23 16 – Excavation
3. Section 31 25 00 – Erosion & Sedimentation Control

1.03 REGULATORY REQUIREMENTS

A. Conform to all applicable local, state, and federal codes for disposal of debris.

B. Coordinate all site clearing work with the utility companies.

1.04 REFERENCES

A. Conform to the applicable portions of Sections 201, 440, and 501 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

1.05 PROJECT CONDITIONS

A. Conduct removals to minimize interference with adjacent building areas. Maintain protected egress and access at all times.

B. Provide, erect and maintain temporary traffic control and security devices in accordance with the standard details and drawings included in the contract documents.

C. Do not close or obstruct roadways and sidewalks without permits and Owner approval.

D. Accept premises as found. Neither Owner, nor Engineer assumes responsibility for condition of areas or continuation of areas in condition existing at or after date of bidding documents.

1.06 SUBMITTALS (RESERVED)

PART 2 – PRODUCTS (RESERVED)

PART 3 – EXECUTION

3.01 CLEARING

A. Clear designated areas for access to site and execution of work.

B. Remove designated trees and shrubs, grass, weeds and other vegetation. Grub out stumps, roots, rocks, and obstructions which interfere with installation of new work.

C. Clear undergrowth and deadwood, without disturbing subsoil.

3.02 PROTECTION

A. Protect plant growth and features remaining for final landscaping.

B. Protect bench marks and existing work from damage or displacement.

C. Maintain designated site access for vehicle and pedestrian traffic.

D. Protect existing active utility lines during construction.

E. Utility lines encountered during construction that are not scheduled to be removed must be protected, relocated, or scaled and capped by appropriate trades having jurisdiction.

F. Protect all existing items not indicated to be removed.

3.03 REMOVAL

A. Remove all waste materials from the Owner's property and legally dispose of same.

B. All topsoil shall be stockpiled onsite or at a location as approved by the Owner. Any excess topsoil shall be removed from the project site and properly disposed of off-site.

C. Do not store debris, remove as it accumulates. If Contractor fails to remove debris promptly, the Engineer reserves the right to cause same to be removed at Contractor's expense. Debris may not be burned or buried on the site.

D. Provide all measures of protection required by state authorities, regulations, and laws for protection of surrounding property, sidewalks, curbs, the public and all employees during removal operations. Measures taken, including sidewalks, sheds (if required), barricades, warning lights and signs, and rubbish chute (if required), shall be in strict accordance with the American Standard Building Construction A10-2-1944 and all applicable state and federal laws. Provide all protection as required by codes having jurisdiction and maintain until no longer necessary.

3.04 CLEAN UP

A. Upon completion of work remove tools, materials, apparatus, debris and rubbish of every sort. Leave premises clean, neat and orderly.

END OF SECTION 31 10 00

SECTION 31 22 13
ROUGH GRADING

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Excavate subsoil and stockpile for later reuse. Remove excess from site.

B. Grade and rough contour site improvement areas.

1.02 RELATED WORK

A. Specified Elsewhere:

1. All Sections of Division 31 and 32.

1.03 SUBMITTALS

A. Accurately record location of remaining, rerouted or new utilities by horizontal dimensions, elevations or inverts, and slope gradients on Contract Documents.

B. Submit test results of compaction testing – See Section 31 23 23 - Fill.

1.04 REFERENCES

A. Conform to the applicable portions of Sections 202 and 205 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

1.05 PROTECTION

A. Protect existing trees, shrubs, lawns and other features remaining as portion of final landscaping.

B. Protect benchmarks, existing structures, fences, roads, sidewalks, paving, curbs and all other items to remain.

C. Protect above- or below-grade utilities which will remain.

D. Protect work from damage caused by settlement or movement caused by rough grading.

E. Repair damage.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Subsoil: Excavated material (other than topsoil) which is graded free of lumps larger than 6 inches, rocks larger than 3 inches and debris.

PART 3 – EXECUTION

3.01 PREPARATION

A. Identify specified lines, levels, contours and data.

B. Identify known below grade utilities. Stake and flag locations.

C. Identify and flag above grade utilities.

D. Maintain and protect existing utilities remaining which pass through work area.

E. Notify Utility Companies to remove and relocate necessary utilities.

F. Upon discovery of unknown utility or concealed conditions, discontinue affected work and notify the Engineer immediately. Confirm notification in writing.

G. Visit the site and become familiar with all existing conditions under which work is to be performed.

3.02 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout or damage by rain or water accumulation.

C. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.03 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be re-landscaped or regraded and stockpile in area designated on site. Remove excess subsoil not being reused from Project site.

B. Excavate and remove all organic, loose or obviously compressive materials. The subgrade shall then be proof-rolled until the grade offers an unyielding surface and until the specified compaction is achieved; refer to Section 31 23 23 - Fill. Areas of excessive yielding shall be excavated and backfilled with clean, compacted soil that meets the approval of the Engineer.

C. Do not excavate wet subsoil.

D. Stockpile subsoil to depth not to exceed 4 feet.

E. When excavating through roots, perform work by hand and cut roots with a sharp axe.

3.04 TOLERANCES. Top surface of subgrade: Plus or minus 1 inch.

3.05 TESTING AND COMPACTION. Refer to Section 31 23 23 - Fill.

END OF SECTION 31 22 13

SECTION 31 23 16
EXCAVATION

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Excavating for sewers, pavements, sidewalks, curbs and gutter and incidental work.

B. Removal and off-site satisfactory disposal of unstable and unsuitable materials.

1.02 RELATED WORK (RESERVED)

1.03 REGULATORY REQUIREMENTS

A. Codes and Standards:

1. Conform to the applicable portions of Sections 202 and 502 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.
2. Prior to the commencement of construction, the Contractor shall be aware of, and become familiar with applicable local, state and federal safety regulations, including the current OSHA Occupational Safety and Health Standards - Excavations, 29 CFR Part 1926, including any successor regulations.
3. Additionally, the Contractor shall be aware that slope height, slope inclination and excavation depths (including utility trench excavations) should in no case exceed those specified in local, state or federal safety regulations.

1.04 COORDINATION

A. Do not interrupt existing utilities serving facilities occupied and used by Owner or others except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided. Provide minimum of 48-hour notice prior to enacting an approved temporary interruption.

1.05 SUBMITTALS (RESERVED)

PART 2 – PRODUCTS (RESERVED)

PART 3 – EXECUTION

3.01 EXAMINATION

A. Site Information

1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn there from by Contractor. Data are made available for convenience of Contractor.
2. Contractor shall be responsible for determining the actual ground water elevation and soil conditions at the specific site prior to commencing with the excavation. It may be expedient to drill auger holes, excavate test pits or make additional soil borings at or adjacent to the construction area immediately prior to construction to determine the prevailing soil conditions and water table elevation. It is the Contractor's responsibility to make auger holes, excavate test pits or make additional soil borings, as he deems appropriate to determine the ground water and soil conditions that will be encountered. Additional test borings and other exploratory operations made by the Contractor shall be at no cost to the Owner.

3.02 PREPARATION

A. Establish extent of excavated areas.

B. Identify and set required lines, levels and contours.

C. Maintain benchmarks, monuments and other reference points.

D. Before starting excavation, establish location and extent of underground utilities occurring in work area. Contact Joint Utility Locating Information for Excavators (J.U.L.I.E.) (800) 892-0123 or all other utility companies on the project site which are not members of this system.

3.03 EXCAVATION

A. General

1. Excavation consists of removal and redistribution of material encountered when establishing required grade and subgrade elevations, including stripping of topsoil.
2. The Contractor is solely responsible for designing and constructing stable excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. All excavations shall comply with applicable local, state and federal safety regulations including the current OSHA Occupational Safety and Health Standards - Excavations, 29 CFR Part 1926, including any successor regulations.
3. All sheeting, shoring and bracing of trenches, pits and excavations shall be the sole responsibility of the Contractor.
4. Construction site safety is the sole responsibility of the Contractor, including but not limited to, the means, methods, and sequencing of construction operations.
5. Earth excavation consists of stripping of topsoil, removal and disposal of pavements

and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on sub-surface conditions, and other materials encountered that are not classified as unauthorized excavation.

B. Unauthorized Excavation

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, only when acceptable to the Engineer. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by Engineer.

C. Additional Excavation

1. When excavation has reached required sub-grade elevations, notify Engineer who will make an inspection of conditions. If unsuitable bearing materials are encountered at required sub-grade elevations, carry excavations deeper and replace excavated material as directed by Engineer. Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to change in work.

D. Dewatering

1. Prevent surface water and subsurface or ground water from flowing into excavation and from flooding project site and surrounding area.
2. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
3. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

E. Material Storage

1. Stockpile satisfactory excavated materials in the location designated by the Engineer or Owner, 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. Contain excavated silt/soil runoff with silt fences in accordance with Local, State and Federal Requirements.

F. Excavation Near Utilities

1. Protect, support, shore, brace, etc. all utility services uncovered by excavation.
2. Accurately locate and record abandoned and active utility lines rerouted or extended, on Contract Documents.
3. Repair damaged utilities to the satisfaction of the Utility Owner.

G. Disposal of Excess and Waste Materials

1. Removal from Owner's Property

a. Remove waste materials, trash and debris and legally dispose of it off Owner's property.

2. Excess Material

a. Excess excavated material shall be removed from the site and properly disposed of.

H. Topsoil

1. Topsoil shall be stripped from site so that all organic materials, stumps, and roots are removed from the site.
2. Contractor shall stockpile sufficient clean topsoil onsite for reuse and shall dispose of all excess or unsuitable material in accordance with existing state and federal regulations.
3. Temporary topsoil stockpiles shall be temporarily stabilized as required.

3.04 FIELD QUALITY CONTROL

A. The Contractor shall allow bearing surfaces at the bottom of excavations to be inspected by the Engineer and shall modify the bearing surfaces as requested by the Engineer, prior to placement of any base materials.

B. Proofrolling. Subgrades shall be proofrolled to detect areas of insufficient compaction. Proofrolling shall be accomplished by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck with a maximum weight of 20 tons, or approved equal, in each of 2 perpendicular directions while under the supervision and direction of the independent testing laboratory. Areas of failure shall be excavated and recompacted as specified herein. Continual failure areas shall be stabilized at no additional cost to Owner. Subgrade exposed longer than 48 hours or on which precipitation has occurred shall be re-proofrolled.

3.05 PROTECTION

A. Stability of Excavation

1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

B. Cold Weather Protection

1. Protect excavation bottoms against freezing when atmospheric temperature is less than $35^{O}F$ ($1^{O}C$).

C. Protection of Persons and Property

1. Fence and barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required by authorities having jurisdiction.
2. Protect structures, landscaping, utilities, sidewalks, pavements or other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
3. Comply with current OSHA Occupational Safety and Health Standards - Excavations, 29 CFR Part 1926, including any successor regulations.

END OF SECTION 31 23 16

SECTION 31 23 23
FILL

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Preparation of subgrade for pavements, sidewalks and curb and gutters.

B. Backfill for site utilities.

C. Fill for over-excavation.

D. Consolidation and compaction of all fill material.

1.02 RELATED WORK

A. Specified Elsewhere:

1. Section 31 23 16 – Excavation
2. Section 32 12 16 – Asphalt Paving
3. Section 32 13 13 – Concrete Paving

1.03 REFERENCE TO STANDARDS

A. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3).

B. ASTM D4253 - Maximum Index Density and Unit Weights of Soils Using a Vibratory Table.

C. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Latest Edition.

D. Illinois Department of Transportation (IDOT) – Project Procedures Guide

1.04 REGULATORY REQUIREMENTS

A. Conform to the applicable portions of Sections 202, 205 and 301 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

1.05 SUBMITTALS

A. Submit copies of Standard Proctor Density Test results to Engineer a minimum of seven

business days prior to backfilling any excavations.

1.06 QUALITY ASSURANCE

A. Compaction Testing

1. Standard Proctor Density Testing and Compaction Testing of fill materials and inspection of subgrades and fill layers will be performed by the Contractor's testing service, using Proctor information furnished by the Contractor.
2. If, in opinion of Engineer, based on testing service reports and inspection, subgrade or fills, which have been graded or placed on-site are below specified density, provide additional compaction and testing at no additional expense to the Owner.
3. When, during progress of work, tests indicate that compacted materials will not meet specifications, remove defective work, replace and retest at no additional cost to the Owner.
4. Ensure that all compacted fills are tested before proceeding with placement of surface materials.

1.07 FIELD TESTS

A. Compaction Tests

1. Contractor shall make arrangements with an independent laboratory for completing compaction tests and shall pay for those tests. They shall also make arrangements with testing firm to have sufficient number of personnel from the testing laboratory and testing equipment in good working order during all placement and compaction operations. Name of testing firm chosen by Contractor shall be submitted to Engineer for approval prior to beginning of backfilling. Engineer reserves right to reject testing firm at any time during construction and to require another testing firm to perform tests.

1.08 PROTECTION

A. Protect and avoid all existing underground utilities during construction operations. Repair of any utilities damaged by construction shall be the responsibility of the respective Contractor.

PART 2 – PRODUCTS

2.01 DEFINITIONS

A. Suitable Soil

1. Suitable soil is a soil having less than 5% organic matter by weight as determined by the Loss on Ignition Test (determine weight loss caused by heating sample to 500^{o} C for 6 hours after drying in accordance with ASTM D-2216, "Laboratory

Determination of Moisture Content of Soil").

B. Unsuitable Soil

1. Unsuitable soil is a soil that contains 5% or more organic matter as determined by the Loss of Ignition Test previously specified, rubbish, vegetable matter of every kind, roots, and boulders larger than 5 inches in dimension which might interfere with the proper bonding to adjacent contact surfaces, or as otherwise determined unsuitable by the Engineer.

C. Cohesive Soil

1. Cohesive soil is a soil containing more than 50 percent fine material passing the No. 200 standard sieve, and with more than 15 percent clay-size particles smaller than 0.002 mm (2 microns). The soil matrix passing the No. 40 standard sieve exhibits dry (crushing) strength in the dry state and cohesive shear strength in the moist state, as well as being plastic in the moist state.

2.02 ENGINEERED FILL MATERIALS

A. General

1. Fill shall meet the requirements of IDOT CA-6 (Class C quality or better) or shall be composed of suitable lean (silty or sandy) clay with liquid limit no greater than 50% and plasticity index no greater than 25%. The on-site clay materials obtained from excavations may be allowed as engineered fill if the material meets these requirements.
2. Engage a qualified independent testing laboratory to test materials from on-site and off-site sources to test materials for conformance to this specification. The name of the testing laboratory shall be submitted to the Engineer for review prior to conducting any tests. Results of tests shall be submitted to the Engineer for review prior to engineered fill material being placed.

2.03 TRENCH BACKFILL MATERIALS

A. General Fill and Cohesive Backfill

1. Provide acceptable soil materials for backfill, free of clay lumps, rock or gravel larger than two inches in dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

B. Granular Backfill and Trench Backfill

1. Granular backfill shall consist of IDOT FA-1, FA-2, FA-5, FA-6, CA-6 or CA-7 or Native Local Bluff Sand. Granular backfill shall be used under steps, stoops, walks, roads, parking lots and against structure walls. (Minimum for inch depth below

walks, steps, etc.).

PART 3 – EXECUTION

3.01 EXAMINATION

A. Prior to placement of any fill or backfill and prior to placement of all subsequent fill lifts, contact Engineer for inspection and testing of excavation subgrade and testing of each compacted layer of fill and backfill material. Provide proctor information necessary for the Engineer to perform density testing on in-place backfill material.

3.02 PREPARATION

A. Backfilling and compaction shall not occur until the following conditions are satisfied:

1. Acceptance by Engineer of construction below finish grade.
2. Inspection, testing, approval and recording locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of trash and debris, vegetation, snow or ice, water, unsatisfactory soil materials, obstructions and deleterious materials.
5. Removal of shoring and bracing and backfilling of voids with satisfactory material.
6. Ensure that ground surface within excavated area to be backfilled is not frozen.
7. When existing ground surface has a density less than that specified under Article 3.03-C of this Section for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content and compact to required depth and percentage of maximum density.

3.03 BACKFILLING AND COMPACTING

A. General

1. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

a. In existing turf areas, use satisfactory excavated or borrow exterior fill material.

B. Placement and Compaction

1. Place backfill, base and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand operated tampers. Heavy equipment including compaction equipment shall not operate within 2 feet of unbraced substructure walls. Compaction in these areas shall be obtained with hand operated compaction equipment or devices. Earth backfill and native soil backfill shall be compacted with sheepsfoot compaction equipment.

2. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen or contain frost or ice.
3. Place backfill and fill materials evenly adjacent to structure to required elevations. Take necessary precautions to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

C. Percentage of Maximum Density Requirements

1. Unless otherwise noted on the plan sheets, compact each layer of soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D698, Standard Proctor Compaction Test; and not less than the following percentages of relative density, determined in accordance with ASTM D 4253 and ASTM D 4254, for soils which will not exhibit a well-defined moisture-density relationship (cohesion less soils).

REQUIRED COMPACTIVE EFFORT				
MATERIAL TESTED	PROCTOR TYPE	MIN % DRY DENSITY	MOISTURE CONTENT	MIN FREQUENCY OF TESTING
Engineered Fill	Standard	97%	-2 to +3%	1 per 2,500 sf of fill placed
Landscape Fill (non-load bearing)	Standard	90%	-2 to +3%	1 per 5,000 sf of fill placed
Utility Trench	Standard	97%	-2 to +3%	1 per 200 lf of backfill placed

D. Moisture Control

1. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water top surface or subgrade or layer of soil material, to prevent free water 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.

E. Grading

1. General

a. Uniformly grade areas within limits of excavation under this Section, including adjacent transition areas. Compact with uniform levels or slopes between such points and existing grades.

b. Remove stones over 1-1/2" in any dimension and sticks, roots, rubbish and other extraneous matter.
c. Rough grade to 6" - 12" below finish, grades and elevations indicated in the drawings.
d. Grading Outside Structure Lines

1. Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
2. Finish surfaces free from irregular surface changes, and as follows:

a. Slabs: Shape surface of areas under slabs to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

2. Grading Surface of Backfill Under Walks and Slabs.

a. Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/4" when tested with a 10' straightedge.

3. Compaction

a. After grading, compact subgrade surfaces to the depth and percentage of maximum or relative density for each area classification.

F. Maintenance

1. Protection of Graded Areas

a. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
b. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

2. Reconditioning Compacted Areas

a. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

3. Settling

a. Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), 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.

3.04 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction

1. Allow the Engineer to inspect subgrades and fill layers before further construction work is performed.
2. If in opinion of Engineer, based on field density testing 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.

END OF SECTION 31 23 23

SECTION 31 25 00
EROSION & SEDIMENTATION CONTROL

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Installation of temporary and permanent erosion and sedimentation control systems.

B. Installation of temporary and permanent slope protection systems.

1.02 RELATED WORK

A. Specified Elsewhere:

1. Section 02 41 00 – Site Demolition
2. Section 31 11 00 – Site Clearing
3. Section 31 23 16 – Excavation
4. Section 31 23 23 – Fill
5. Section 32 92 00 – Seeding

1.03 ENVIRONMENTAL REQUIREMENTS

A. Protect adjacent properties, any identified endangered or threatened species and/or critical habitat, any identified cultural or historic resources, and receiving water resources from erosion and sediment damage until final stabilization is achieved. All storm water controls and systems must be installed & functioning as designed and free of accumulated sediment and debris before final project approval.

PART 2 – REFERENCE TO STANDARDS

2.01 Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Latest Edition.

2.02 Illinois Urban Manual, latest edition.

PART 3 – PRODUCTS

3.01 MATERIALS

A. Turf and ground covers for the establishment of vegetation in accordance with Division 32.

B. All erosion control products, sediment control devices, or materials for non-storm water BMPs as specified herein and on the Construction Drawings.

C. Rolled erosion control products according to Erosion Control Technology Council (ECTC) standard specifications.

D. Temporary mulches such as loose straw or wood cellulose.

E. Temporary and permanent outfall structures as specified on the drawings.

3.02 SUBMITTALS

A. Contractor shall submit shop drawings or material certifications for all manufactured erosion and sediment control materials.

PART 4 – EXECUTION

4.01 PREPARATION

A. Review the drawings and Storm Water Pollution Prevention Plan.

B. Conduct storm water pre-construction meeting with all ground-disturbing contractors, site engineer of record or their representative who is familiar with the site and SWPPP, and state or local agency personnel if available.

C. Revise SWPPP as necessary to address potential pollution from site identified after issuance of the SWPPP at no additional cost to owner.

4.02 EROSION AND SEDIMENTATION CONTROL AND IMPLEMENTATION

A. Place erosion and sediment control systems in accordance with the drawings and Storm Water Pollution Prevention Plan or as may be dictated by site conditions in order to maintain the intent of the specifications and permits.

B. The Storm Water Pollution Prevention Plan and Site Maps shall be corrected or modified as site conditions change. Contractor must obtain approval from Owner's Engineer prior to modifying or substituting Best Management Practices. Changes during construction shall be noted in the Storm Water Pollution Prevention Plan and posted on the drawings (Site Maps).

C. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures.

D. Maintain erosion and sedimentation control systems as dictated by site conditions, indicated in the construction documents, or as directed by governing authorities or Owner to control sediment until final stabilization. Contractor shall respond to maintenance or additional work ordered by Owner or governing authorities immediately, but in no case, within not more than 48 hours at no additional cost to the Owner.

E. Contractor shall incorporate permanent erosion control features, permanent slope stabilization, and vegetation into project at earliest practical time to minimize need for temporary controls.

F. Permanently seed and mulch cut and fill slopes as construction proceeds to extent considered desirable and practical.

G. Disturbed areas that will not be graded or actively worked for the time frame established in the SWPPP and General Permit, shall be temporarily stabilized as work progresses with vegetation or other acceptable means in accordance with Division 32 or as otherwise shown on the plans unless otherwise specified in the Contract Documents. In the event it is not practical to seed areas, slopes must be stabilized with erosion control blankets, mulch and tackifier, bonded fiber matrix, netting, blankets or other means to reduce the erosive potential of the area.

H. Contractor shall adhere to all the terms and conditions as shown on the plans and contained in the IEPA General Permit and SWPPP.

I. Contractor shall provide qualified personnel, in accordance with the attached SWPPP, to inspect disturbed areas of the construction site that have not been finally stabilized, as required by the IEPA General Permit, at least once every seven (7) calendar days and within twenty-four (24) hours of the end of a storm that is 0.5 inches or greater or equivalent snowfall.

4.03 LOCAL JURISDICTIONAL APPROVAL

A. Prior to commencing construction, Contractor shall obtain all required County of City Erosion Control Permits and pay for any applicable fees.

END OF SECTION 31 25 00

SECTION 31 32 00

SOIL STABILIZATION (if required)

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Excavation and backfilling of subgrade for bridge lift stabilization.

B. Geotextile fabric and geogrid for stabilization of subgrade.

1.02 RELATED WORK

A. Specified Elsewhere:

1. Section 31 23 16 – Excavation
2. Section 31 23 23 – Fill

1.03 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. Illinois Department of Transportation (IDOT):

1. Standard Specifications for Construction and Materials.

1.04 SUBMITTALS

A. Submit gradation and certification of material that is to be used to Engineer for review.

B. Submit name of each materials supplier and specific type and source of each material. Obtain approval of Owner/Engineer prior to change in source.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with state and local standards in conjunction with requirements specified herein.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Provide products from one of the following manufacturers as specified in the Materials paragraph below:

1. Mirafi Construction Products, Pendergrass, GA, (800) 685-9990, www.mirafi.com
2. WEBTEC, INC., Charlotte, NC, (800)438-0027, www.webtecgeos.com
3. Tensar Earth Technologies, Inc., Atlanta, GA, (888) 828-5126, www.tensarcorp.com
4. Thrace-LINQ, Inc., Summerville, SC, (843) 873-5800, www.thracelinq.com

2.02 MATERIALS

A. Bridge Lift Material: Material used for the bridge lift shall be in accordance with Article 1004.04 of IDOT's Standard Specifications. IDOT's gradation CA-2 & CA-6 will be required unless otherwise approved by the Engineer.

2.03 ACCESSORIES

A. Geotextile Fabric for Stabilization: Provide one of the following:

1. Mirafi HP 370 or HP 570, by TenCate.
2. SF40 or SF65, by DuPont.
3. GTF-200 or 300, by Thrace-LINQ.
4. TerraTex HD, by Hanes.

B. Geogrid for Stabilization: Provide one of the following:

1. Biaxial Geogrid Type 1 (formerly BX 1100), by Tensar.
2. Biaxial Geogrid Type 2 (formerly BX 1200), by Tensar.
3. Mirafi BXG 11, by TenCate.
4. Mirafi BXG 12, by TenCate.

PART 3 – EXECUTION

3.01 PREPARATION

A. Obtain approval before proceeding with installation.

B. Start stabilization only when weather and soil conditions are favorable for successful application of proposed material.

C. Proofroll subgrade to identify areas in need of stabilization.

3.02 EQUIPMENT

A. Perform operations using suitable, well-maintained equipment capable of excavating subsoil and placing and compacting of material.

3.03 EXCAVATION

A. Excavate subsoil to depth sufficient to accommodate soil stabilization.

B. Remove lumped subsoil, boulders, and rock that interfere with achieving uniform subsoil conditions.

C. Do not excavate within normal 45 degree bearing splay of any foundation.

D. Notify Owner's Representative of unexpected subsurface conditions. Discontinue affected work in area until notified to resume work.

E. Correct areas over-excavated in accordance with Section 31 23 23 - Fill.

F. Remove excess excavated material from site.

3.04 GEOTEXTILE FABRIC AND/OR GEOGRID

A. Place geotextile fabric and/or geogrid over subsoil surface, lap edges and ends in accordance with manufacturer's recommendations in those areas that are shown on Construction Drawings or in those areas that need additional stabilization prior to placement of base course. Bridge lift sections may require the use of geotextile fabric and/or geogrid for stabilization prior to placement of fill.

B. Place geotextile fabric and/or geogrid in accordance with manufacturer's recommendations.

3.05 SOIL TREATMENT AND BACKFILLING

A. Bridge Lifts: Where indicated on Construction Drawings or as required after processing the subgrade in accordance with Section 301 of the IDOT Standard Specifications, treat prepared subgrade by application of a bridge lift. Bridging over existing soils shall be acceptable only when approved in writing by the Owner or Owner's Representative. Excavate 24" of unsuitable soil and place geotextile fabric over existing soils to be bridged. The geotextile fabric shall be appropriate for the bridge lift material being placed. Place bridge lift consisting of 18" CA-2 aggregate over geotextile fabric and cap with 6" of CA-6 aggregate. The Owner and the Owner's representative shall have sole discretion as to the acceptability of all submittals.

B. Backfill and compaction of treated subsoil shall be in accordance with Sections 31 23 23 - Fill.

C. Finish subgrade surface in accordance with Section 31 22 19 – Finish Grading.

D. Remove surplus mix materials from site.

3.06 FIELD QUALITY CONTROL

A. Responsibilities: Unless otherwise specified, the quality control tests and inspections specified below will be conducted by the Contractor at no additional cost to the Owner. The Contractor shall perform additional testing or inspection as considered necessary for assurance of quality control.

B. Field Density: Field in-place density shall be determined as specified in Section 31 23 23 - Fill.

C. If tests indicate work does not meet specified requirements, Contractor shall remove and replace work. Corrected areas shall be retested.

END OF SECTION 31 32 00

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Furnish, place and compact an aggregate base course under the proposed pavements to the depths and at the locations shown on the plans.

1.02 RELATED WORK

A. Specified elsewhere:

1. Section 31 23 16 – Excavation.
2. Section 31 23 23 – Fill.
3. Section 31 32 00 – Soil Stabilization.
4. Section 32 12 16 – Asphalt Paving.
5. Section 32 13 13 – Concrete Paving.

1.03 REGULATORY REQUIREMENTS

A. Conform to the applicable portions of Section 351 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

1.04 SUBMITTALS

A. Submit gradation and certification of material that is to be used to Engineer for review.

B. Submit name of material supplier.

C. Submit copies of Standard Proctor Density Test results to Engineer a minimum of twenty-four (24) hours prior to paving.

1.05 QUALITY ASSURANCE

A. Compaction Testing

1. Standard Proctor Density Testing and Compaction Testing of all aggregate base courses will be performed by the Contractor's testing service, using Proctor information furnished by the Contractor.

2. If, in opinion of Engineer, based on testing service reports and inspection, subgrade or fills, which have been graded or placed on-site are below specified density, provide additional compaction and testing at no additional expense to the Owner.
3. When, during progress of work, tests indicate that compacted materials will not meet specifications, remove defective work, replace and retest at no additional cost to the Owner.
4. Ensure that all compacted subbases are tested before proceeding with placement of surface materials.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Type B: Material used for aggregate base course shall be in accordance with Article 1004.04 of IDOT's Standard Specifications. IDOT's gradation CA-6 will be required for all impervious paved surfaces unless otherwise approved by the Engineer.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verify existing subgrade has been compacted and prepared and is dry and that all gradients and elevations are correct.

3.02 PREPARATION

A. Correct any irregularities in gradient and elevations by scarifying, reshaping and re-compacting.

B. Do not place fill on soft, muddy or frozen surfaces.

C. Prior to placement of aggregate base course, the subgrade shall be prepared in accordance with Section 301 of the IDOT Standard Specifications and shall be proofrolled to detect areas of insufficient compaction. Proofrolling shall be accomplished by making a minimum of 2 complete passes with a fully loaded tandem-axle dump trump with a maximum weight of 20 tons, or approved equal, in each of 2 perpendicular directions. The Contractor shall document all proofroll procedure and results. Areas of failure shall be stabilized in accordance with Section 31 32 00 – Soil Stabilization.

D. Maintain moisture content of the subgrade between -2% and +3% optimum at the time of paving.

3.03 AGGREGATE PLACEMENT

A. Spread aggregate over the prepared subgrade to the lines and grades shown in the plans in accordance with IDOT's Standard Specifications.

B. Compact base material to not less than 97% standard proctor.

C. Water shall be added as required by the Engineer to obtain satisfactory compaction.

3.04 TOLERANCES. Top surface of aggregate: Plus or minus 1/4 in.

3.05 SURPLUS MATERIALS

A. Remove surplus materials from site.

END OF SECTION 32 11 23

SECTION 32 12 16
ASPHALT PAVING

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Cleaning and priming aggregate base courses for bituminous concrete binder course.

B. Bituminous concrete binder and surface course paving at the locations indicated on drawings.

C. Quality Control / Quality Assurance sampling and testing.

1.02 RELATED WORK

A. Specified elsewhere:

1. Section 31 23 16 – Excavation
2. Section 31 23 23 – Fill
3. Section 31 25 00 – Erosion & Sedimentation Control
4. Section 31 32 00 – Soil Stabilization

1.03 REGULATORY REQUIREMENTS

A. Conform to the current and applicable portions of Section 406 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, latest edition, including all Supplemental Specifications and Recurring Special Provisions.

1.04 QUALITY ASSURANCE

A. Mix designs shall be for bituminous concrete mixes approved and used by IDOT within the last year.

B. Mixing Plant: Conform to IDOT's prequalification requirements for producing IDOT specified mix designs.

C. Obtain materials from same source throughout paving operations.

1.05 SUBMITTALS

A. Submit IDOT approved mix designs of each class of mix and IDOT approved material sources for review at least four weeks prior to beginning of work.

1.06 JOB CONDITIONS

A. Provide access to job for all contractors and subcontractors by using drives to fullest extent possible and, when specified, by constructing temporary roadways on portions of base course.

B. Delay bituminous paving until after primary construction work is complete; unless concrete trucks, material delivery trucks, and other heavy construction vehicles can be detoured around roadway.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not place bituminous mixtures when ambient air or base temperature is less than 40 degrees F or surface is wet or frozen.

PART 2 – PRODUCTS

2.01 BITUMINOUS CONCRETE BINDER AND SURFACE COURSE

A. Materials: Conform to the Illinois Department of Transportation's Standard Specification. Mixes shall conform to the following:

1. Bituminous Concrete Binder Course:
   a. PG 64-22
   b. RAP % (Max) = 25
   c. Design Air Voids – 4.0% @ Ndesign = 50
   d. Mixture Composition (Gradation Mixture) – IL-19.0

2. Bituminous Concrete Surface Course:
   a. PG 64-22
   b. RAP % (Max) = 15
   c. Design Air Voids - 4.0% @ Ndesign = 50
   d. Mixture Composition (Gradation Mixture) - IL-9.5 (Mix C)

B. RAP Materials: Conform to the Illinois Department of Transportation's Special Provision, "Reclaimed Asphalt Pavement (RAP)" and as specified herein. Up to 25% RAP will be allowed in the binder course and up to 15% RAP in the surface course.

C. Prime Coat: Medium curing cut-back asphalt or asphalt emulsion penetrating prime coat consisting of either MC-30, SS-1h, Asphalt Emulsion Prime (AEP), or equivalent.

D. Tack Coat: Emulsified asphalt; AASHTO M140 or AASHTO M208, SS-1h, CSS-1, or CSS-1h, may be diluted with up to 1 part water to 1 part asphalt.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect areas and conditions where bituminous concrete paving is to be installed.

1. Proof roll subgrade with loaded tandem vehicle to verify that subgrade is dry and compacted and ready to support paving operations.
2. Notify Engineer of conditions detrimental to proper and timely completion of work.
3. Request resolution of conditions.

B. Protection:

1. Provide protection for all adjacent work and areas.

3.02 PREPARATION – BITUMINOUS PRIME MATERIAL

A. Apply bituminous prime coat to aggregate base course in accordance with IDOT Standard Specifications.

B. Apply bituminous prime to contact surfaces of curbs, gutters and pavement edges.

C. Use clean sand to blot excess primer.

D. Apply bituminous prime to binder course prior to placement of the surface course as directed by the Engineer.

3.03 FRAME ADJUSTMENTS

A. Set frames for manholes and other units, within areas to be paved, to final grade as part of this work.

1. Include existing frames or new frames furnished in other sections of these specifications.

B. Surround frames set to grade with ring of compacted bituminous base prior to paving.

1. Place bituminous mixture up to 1 inch below top of frame, slope to grade and compact with hand tamp.

C. Adjust frames to proper grade for paving.

1. Provide temporary closures over openings until completion of rolling operations.

2. Remove closures at completion of work.
3. Set cover frames to grade, flush with surface of adjacent pavement.

3.04 BITUMINOUS CONCRETE BINDER AND SURFACE COURSE

A. Construct in accordance with IDOT Standard Specifications.

1. Work includes complete construction of courses on prepared base course indicated on drawings, profiles and typical sections for proposed paved parking areas.

3.05 CONSTRUCTION TESTING

A. Contractor shall complete all Quality Control / Quality Assurance testing in accordance with IDOT's Standard Specifications.

B. Contractor shall provide and pay for an independent testing company to complete the Quality Assurance tests outlined to be completed in IDOT's Standard Specification.

END OF SECTION 32 12 16

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Concrete pavements.

B. Concrete sidewalks.

C. Concrete curb and gutters.

1.2 RELATED WORK

A. Specified elsewhere:

1. Section 02 4100 – Site Demolition
2. Section 31 2316 – Excavation
3. Section 31 2323 – Fill

1.3 REGULATORY REQUIREMENTS

A. Conform to the applicable portions of Section 420, 424 and 606 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

B. Illinois Department of Transportation (IDOT) – Project Procedures Guide (March 1, 2006).

C. Applicable IDOT Highway Standards – Attached at end of this Section.

1.4 QUALITY ASSURANCE

A. Conform to the Illinois Department of Transportation's Recurring Special Provision Check Sheet #31, "Quality Control / Quality Assurance of Concrete Mixtures" (Revised January 1, 2009).

1.5 REFERENCES

A. American Concrete Institute (ACI) ACI 330R-08 – Guide for the Design and Construction of Concrete Parking Lots.

1.6 JOB CONDITIONS

A. Traffic Control:

1. Restrict traffic access from any concrete slab for a minimum 7 days unless tests are made to determine that the concrete has gained adequate strength.

1.7 SUBMITTALS

A. Submit under the provisions of Division 01 – Section 01 3300 – Submittals.

B. Submit mix designs, materials mix ratio and laboratory test data to the Engineer prior to beginning paving activities.

C. Submit jointing plan for each concrete pavement area to the Engineer for review and approval prior to beginning paving activities.

D. Submit product data for each joint sealant application and product indicated.

PART 2 - PRODUCTS

2.1 FORM MATERIALS, REINFORCEMENT AND CONCRETE

A. Materials: Conform to Section 1103 of the IDOT Standard Specifications for the given type of work to be performed, unless otherwise approved by the Engineer.

2.2 EXPANSION JOINTS

A. Materials: In conformance with IDOT Standard Specifications, except do not use bituminous poured joint materials in sidewalks; seal joints.

2.3 CONCRETE MIXES (PAVING)

A. Concrete: Conform to Section 1020 of the IDOT Standard Specifications for the given type of work to be performed, unless otherwise approved by the Engineer.

B. Do not use chloride or other chemicals to prevent freezing.

C. Provide 5.5% - 7% Air Entrainment (measured at the point of placement).

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect areas and conditions where concrete paving is to be installed.

1. Notify Engineer, in writing, of conditions detrimental to proper and timely completion of work.

3.2 FACILITIES

A. Locate manholes, valve boxes and similar items; adjust to proposed concrete surface elevation.

3.3 CONSTRUCTION METHODS

A. Concrete shall be placed in accordance IDOT's Standard Specifications.
B. Joints shall be constructed in accordance with the plans and details.

3.4 CONSTRUCTION TESTING

A. Contractor shall provide and pay for an independent testing company to complete the Quality Assurance tests outlined to be completed by the Department in IDOT's Standard Specification.

END OF SECTION 32 13 13

SECTION 32 92 19
SEEDING

PART 1 – GENERAL

1.1 WORK INCLUDES

A. Provide seedbed preparation.

B. Provide topsoil.

C. Provide and spread fertilizer, pre-seed.

D. Provide and install turf seed.

E. Provide and install mulch.

F. Provide turf maintenance.

G. Warranty

1.2 RELATED WORK

A. Section 31 2500 – Erosion & Sedimentation Control

B. Section 31 2219 – Finish Grading

1.3 QUALITY ASSURANCE

A. All work described in this Section is to be done by a firm specializing in such work with documented 5 years' experience in seeding of similar sites. The personnel of the firm shall be experienced in the work specified and shall work under the direction of a skilled foreman.

B. General Contractor personnel engaged in herbicide application shall have an Illinois Applicator's License.

1.4 WARRANTY

A. General Contractor shall warranty turf for one complete growing season. If seed does not germinate and develop into healthy turf, Contractor shall re-seed following these seeding specifications, over-seed or otherwise provide remedial work necessary for successful turf development as directed by the Owner's Representative.

1.5 SUBMITTALS

A. Proposed seed source.

B. Any proposed deviation from specified seed mix.

C. Upon completion of work, tags from all bags of seed and fertilizer used at this site listing composition and weight.

PART 2 – PRDOUCTS

2.1 SEED / FERTILIZER

A. Turf Grass Seed shall be true to species and variety and labeled with quantity/quality information listed below. Should the pure live seed be less than the required listing, increase seeding rate to obtain an equal amount of pure live seed per acre. Seed to contain no noxious weed seeds and no more than 2% total inert/other crop seeds.

B. Premixed in sacks, each bearing a tag with the following information clearly printed: Date, location of packaging, seed mixture, percentage of pure live seed, year of production and weight.

Lb/acre	Common Name
200	* Turf-Type Tall Fescue
20	** Kentucky Blue Grass
20	*** Perennial Ryegrass
20	**** Creeping Red Fescue

*Turf-Type Tall Fescue shall be a mixture of three or more of the following varieties with one variety being a rhizomatous tall fescue (RTF): Labarinth (RTF) Tall Fescue, Barrington Tall Fescue and Barrera Tall Fescue

** Blue Grass shall be a mixture of one or more of the following varieties: Barrister, Chateau, Destiny, Enmundi, Gnome, Marquis and Suffolk

*** Rye Grass shall be a mixture of three or more of the following varieties: All Star, Caddie, Caliente, Dasher II, Diplomat, Pennant and SR 4000

**** Creeping Red Fescue shall be either Dawson or Pennlawn

Pre-seed Fertilizer

1. Nutrients: Commercial slow-release nitrogen, phosphorus and potassium mixed in a 1:1:1 ratio of active ingredients and applied at a rate that will yield the number of actual nutrient pounds per acre as required.
2. Premixed in sacks each bearing a tag with the following information clearly printed: name and address of manufacturer, brand, weight, chemical composition and guarantee of analysis.

C. Post-seed Fertilizer

1. Nutrients: Commercial slow-release nitrogen, phosphorus and potassium mixed in a 2:1:1 ratio of active ingredients and applied at a rate that will yield the number of actual nutrient pounds per acre as required.
2. Premixed in sacks each bearing a tag with the following information clearly printed: Name and address of manufacturer, brand, weight, chemical composition and guarantee of analysis.

2.2 MULCH

A. Mulch shall be granular cellulose mulch free from weeds, seeds and foreign materials that may hinder good turf development.

PART 3 - EXECUTION

3.1 TOPSOIL

A. Area is to have not less than 6” of good topsoil over all areas to be seeded.

B. Remove any foreign material including sticks, stones and construction debris including aggregate.

3.2 EXISTING PLANT GROWTH

A. Remove, strip and dispose of all existing turf or other vegetation over areas to be seeded.

3.3 TURF LAWN SEEDING

A. Time of Operations

1. Prepare seedbed and seeding when soil is relatively dry to avoid clodding and compaction of soil.
2. Seeding dates unless otherwise authorized:

a. Spring Seeding – As early in spring as conditions allow but no later than May 31.
b. Fall Seeding – Between August 15 and September 31.

B. Seedbed Preparation

1. Before placing topsoil, rake subsoil surface clear of stones, debris and roots. Disk, drag, harrow or hand rake subgrade to a depth of 6 inches and remove stones larger than 1/2 inch to provide bond for topsoil.
2. Spread topsoil to a depth of 6 inches. Adjust depth of topsoil in areas adjacent to paved surfaces or curbs to allow for placement of seed.
3. Till areas designated for seeding to a minimum depth of 4 inches.
4. Remove all foreign material including vegetation, trash and debris, stones and aggregate.
5. Soil particles no large than one inch in diameter.
6. Hand rake all topsoil areas to be flush with adjacent paving. All areas to drain away from building and sidewalks. Float areas to smooth, uniform grade as indicated on the drawings. Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls, such as walks, curbs or buildings.
7. Final grades shall be approved by the Owner's Representative before seeding.

C. Pre-Seed Fertilizing

1. Within 24 hours of seedbed preparation, fertilize area with 200 lb. of actual nutrient per acre using Pre-Seed Fertilizer.

D. Seeding

1. Seed into freshly prepared seed bed. If the seed bed is crusted-over or damaged, re-prepare seedbed prior to seeding.
2. Seeding method shall be broadcasting uniformly over the prepared seedbed. Rake or drag seedbed to incorporate seed in the top 1/2 inch soil.

E. Mulch

1. Uniformly cover area with granular cellulose mulch.
2. Apply water to the mulch at a rate and duration to expand and disperse the granular mulch.
3. Clean-up any mulch blown beyond the seeded area.

F. Watering

1. Contractor shall water seeded areas to optimize germination and successful turf establishment.
2. Water to achieve a recommended rate of 5 gallons per square yard every 2 days until established. Rainfall may relieve the need for watering at certain times.
3. Water in a manner to achieve infiltration of water and avoid run-off and soil erosion.
4. Supply hoses and other equipment needed.

G. Mowing

1. Mow seeded lawn areas three (3) consecutive times, including edges around driveways, sidewalks and mulched areas.
2. Mow with reel-type or rotary-type mowers, edges, etc. with sharp blades set level. Mowed area shall be smooth and uniform in height.
3. Mow when the grass is relatively dry and ground is firm.
4. Mow when growth reaches height of 5 inches. Cut to a height of 3 inches. If Contractor delays result in excess growth prior to mowing, also rake and remove cuttings from the site.

3.5 TURF MAINTENANCE

A. Maintain seeded areas for a minimum of 90 days or until final project approval, whichever is longer.

1. Watering

a. Provide hoses, portable sprinkling devices and other equipment necessary for successful watering.
b. Water seeded area as needed to achieve optimum establishment and growth. Water to achieve a recommended rate of 5 gallons per square yard every 2 days until established. Rainfall may relieve the need for watering at certain times.
c. Water in a manner to achieve infiltration of water and avoid run-off and soil erosion.
d. Water is assumed to be available at fire hydrants only. Contractor to obtain and pay for a temporary water meter from the City of Springfield and for all water use.

2. Mowing

a. Mow seeded areas including around all sidewalks and mulched plant beds.

b. Mow when grass is relatively dry and ground is firm.

c. Mow when growth reaches a height of 5 inches. Cut to a height of 3 inches. If Contractor delay results in excess turf growth prior to mowing, Contractor must also rake and remove clippings from site.

3. Post-Seed Fertilizing

a. Thirty (30) days following the first mowing, re-fertilize turf areas at the rate of 200 lbs. per acre of actual nutrient using Post-Seed Fertilizer.

4. Weeding

a. Keep areas free of weed growth.

5. Treatments

a. Treat turf for insects, disease, fungus or other adverse conditions that develop. Discuss conditions with Owner's Representative and agree to an appropriate treatment. Provide treatment following good horticultural practices and product manufacturer's guidelines.

6. Replacement

a. If seed does not germinate and develop into healthy turf, Contractor shall re-seed following these seeding specifications, over-seed or otherwise provide remedial work necessary for successful turf development as directed by the Owner's Representative. Seed reinstalled prior to project approval is not considered part of the warranty replacements. After installation approval, any seeding will be covered under the warranty.

3.4 CLEAN UP

A. Leave site clean and free of debris. Repair any damage to the satisfaction of the Owner's Representative.

B. Remove and dispose of any excess material offsite.

END OF SECTION 32 92 19

SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Storm sewer system including pipes and bedding material indicated on drawings.

B. Fittings and accessories to complete the drainage system.

1.02 RELATED WORK

A. Specified elsewhere:

1. Section 31 23 16 – Excavation
2. Section 31 23 23 – Fill
3. Section 31 25 00 – Erosion & Sedimentation Control
4. Section 33 49 00 – Storm Drainage Structures

1.03 REFERENCES. Specified references, or cited portions thereof, current at date of bidding documents unless otherwise noted, govern the work.

A. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all addenda.

B. Standard Specifications for Water & Sewer Main Construction in Illinois.

1.04 REGULATORY REQUIREMENTS

A. Conform to the applicable portions of Section 550 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

1.05 DELIVERY, STORAGE AND HANDLING

A. Transport, deliver, unload, store and handle all pipe and fittings to prevent damage to materials or work.

B. All damaged, broken or otherwise defective materials will be rejected.

C. Store all circular gaskets and special lubricants in packaged materials with manufacturer's name, brand and all other specific data plainly marked thereon.

1.06 SUBMITTALS

A. Accurately record actual locations of pipe runs, connections, manholes, inlets and invert elevations.

B. Submit product data for approval.

PART 2 – PRODUCTS

2.01 STORM SEWERS

A. Reinforced Concrete Pipe (RCP) conforming to Article 550.02 and 550.03 of the IDOT Standard Specifications for the size, class & type of sewer shown on the plans.

2.02 JOINT MATERIAL

A. RCP Pipe:

1. Preformed Flexible Gaskets – Conforming to Section 1055 of the IDOT Standard Specifications.

PART 3 – EXECUTION

3.01 INSPECTION

A. Site Inspection: Inspect site and verify all grades, levels and conditions are as indicated on the layout drawings.

B. Inspect all areas and conditions where drainage structures are to be installed.

1. Inspect field conditions before ordering materials.
2. Notify Engineer in writing of conditions detrimental to proper and timely completion of work.
3. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 COORDINATION

A. Schedule work and notify all crafts in time so provisions for their work can be made without delaying project progress.

B. All installations conform to lines and grades shown on drawings.

1. Place structures where indicated on drawings unless their location is changed by the Engineer.

2. Field conditions dictate deviation from drawings, no change made without written authorization of the Engineer.

3.03 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter that could damage piping or impede consistent backfilling or compaction.

3.04 BEDDING

A. Excavate pipe trench in accordance with Section 550.04 of IDOT's Standard Specifications for work of this section.

B. Place bedding material at trench bottom, level materials in a continuous layer.

3.05 INSTALLATION OF STORM SEWERAGE SYSTEM

A. Storm Sewer Lines: Install pipe, fittings and accessories in accordance with Section 550 of IDOT's Standard Specifications.

3.06 HORIZONTAL SEPARATION – WATER MAINS AND SEWERS

A. Water mains shall be located at least ten feet horizontally from any existing or proposed drain, storm sewer, sanitary sewer, combined sewer or sewer service connection.

B. Water mains may be located closer than ten feet to a sewer line when:

1. Local conditions prevent a lateral separation of ten feet; and
2. The water main invert is at least 18 inches above the crown of the sewer; and
3. The water main is either in a separate trench or in the same trench on an undisturbed earth shelf located to one side of the sewer.

C. When it is impossible to meet (1) or (2) above, both the water main and drain or sewer shall be constructed of slip-on mechanical joint cast or ductile iron pipe, asbestos-cement pressure pipe, prestressed concrete pipe, or PVC pipe equivalent to water main standards of construction. The drain or sewer shall be pressure tested to the maximum expected surcharge head before backfilling.

3.07 VERTICAL SEPARATION – WATER MAINS AND SEWERS

A. A water main shall be separated from a sewer so that its invert is a minimum of 18 inches above the crown of the drain or sewer whenever water mains cross storm sewers, sanitary sewers of sewer service connections. The vertical separation shall be maintained for that portion of the water main located within ten feet horizontally of any sewer or drain crossed. A length of water main pipe shall be centered over the sewer to be crossed with joints equidistant from the sewer or drain.

B. Both the water main and sewer shall be constructed of slip-on mechanical joint cast or ductile iron pipe, asbestos-cement pressure pipe, prestressed concrete pipe, or PVC pipe equivalent to water main standards of construction when:

1. It is impossible to obtain the proper vertical separation as described in (1) above;

or

2. The water main passes under a sewer or drain.

C. A vertical separation of 18 inches between the invert of the sewer or drain and the crown of the water main shall be maintained where a water main crosses under a sewer. Support the sewer or drain lines to prevent settling and breaking the water main, as shown on the plans or as approved by the Construction Manager.

D. Construction shall extend on each side of the crossing until the perpendicular distance from the water main to the sewer or drain line is at least ten feet.

END SECTION 33 40 00

SECTION 33 49 00
STORM DRAINAGE STRUCTURES

PART 1 – GENERAL

1.01 WORK INCLUDES

A. New precast storm sewer inlets and manholes with concrete tops and metal frames, lids or grates and accessories.

B. Connection of new storm sewer pipe to existing inlet or manhole structure.

C. Adjust existing manholes, inlets, valve boxes and meter vaults as required by the utility company or the Engineer.

D. New precast concrete flared end sections and headwalls.

1.02 RELATED WORK

A. Specified elsewhere:

1. Section 31 23 16 – Excavation
2. Section 33 40 00 – Storm Drainage Utilities

1.03 REFERENCES. Specified references, or cited portions thereof, current at date of bidding documents unless otherwise noted, govern the work.

A. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all addenda.

B. Standard Specifications for Water & Sewer Main Construction in Illinois.

C. Applicable IDOT Highway Standards – Attached at end of this Section.

1.04 REGULATORY REQUIREMENTS

A. Conform to the applicable portions of Section 602, 604 and 1024 of the Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, including all Supplemental Specifications and Recurring Special Provisions.

PART 2 – PRODUCTS

2.01 PRECAST MANHOLE SECTIONS, STEPS, FRAMES AND LIDS

A. The Contractor shall be required to submit shop drawings of each structure for approval in accordance with these documents, prior to fabricating or delivering any manholes.

B. Manhole and inlet sections, castings and accessories shall conform to Section 602.02 and 604.02 of IDOT's Standard Specifications, IDOT's Highway standards and the project details and drawings included with the contract documents.

C. Connections for storm sewer pipes shall be grouted in place with non-shrink grout material conforming to Section 1024 of IDOT's Standard Specifications.

D. Joints between precast manhole sections and under the casting frame shall be watertight and sealed by means of preformed butyl resin rope or by O-ring rubber gasket. Seal material shall not shrink, harden or oxidize with age. Installation shall be according to manufacturer's recommendations and as shown on the drawings.

E. The Contractor shall adjust the manhole or inlet casting to the final ground line as shown on the plans or as directed by the Engineer in the field. Concrete "adjustment rings" having the same inside diameter as the casting may be used to raise the casting up to a maximum of 6".

PART 3 – EXECUTION

3.01 COORDINATION

A. Schedule work and notify all crafts in time so that provisions for their work can be made without delaying the project.

3.02 INSTALLATION

A. Excavation

In order to permit the joints to be mortared properly and also to permit proper compaction of the backfill material, the excavation shall be made to a diameter of at least two feet greater than the outside diameter of the structure.

B. Subbase Preparation

Adequate foundation for manhole structures shall be obtained by removal and replacement of unsuitable material with well-graded granular material, by tightening with coarse ballast rock, or by such other means provided for foundation preparation of the connected sewers.

C. Manhole Base Installation (Precast Base)

A well-graded granular bedding course conforming to the requirements for aggregate for trench backfill (Section 31 23 23), not less than four inches in thickness and extending to the limits of the excavation, shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast element. A precise base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment and making sure that all entering pipes can be inserted on proper grade.

D. Precast Manholes

1. Precast manholes may be constructed with a precast base section or a monolithic base structure as specified. Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder runs. The completed manhole shall be rigid, true to dimensions and shall be watertight.
2. All lift holes in precast elements shall be completely filled with an approved bitumastic material. All joints between precast elements on sanitary sewer manholes shall be made with an o-ring rubber or neoprene gasket.

E. Construction Detail

1. Inlet and Outlet Pipes. Pipe or tile placed in the masonry for inlet or outlet connections shall extend through the wall and beyond the outside surface of the wall a sufficient distance to allow for connections, and the masonry shall be carefully constructed around them so as to prevent leakage along the outer surfaces. Special care shall be taken to see that the openings through which pipes enter the structure are completely sealed by use of a nonshrink grout.
2. Placing Castings. Casting adjustments of less than two inches shall be with mortar. The mortar shall be mixed in proportion of one part cement to three parts sand, by volume, based on dry materials. Castings shall be set accurately to the finished elevation so that no subsequent adjustment will be necessary. Castings shall be sealed to concrete sections with bitumastic material.
3. Manhole Inverts. Construct manhole flow channels of concrete or sewer pipe, which shall be of semicircular section conforming to the inside diameter changes in size and grade gradually, and changes in direction shall be by true curves. Provide channels for all connecting sewers to each manhole and benching shown on the drawings.

F. Backfill

The space between the sides of the excavation and the outer surfaces of the manhole shall be backfilled with aggregate for trench backfill when the manhole is in a pavement or when the nearest point of the excavation for the manhole falls within two feet of the paved edge.

G. Cleaning

All newly constructed inlets and manholes and any existing structures modified shall be cleaned of all accumulation of silt, debris or foreign matter of any kind and shall be free of such accumulations at the time of final inspection.

END OF SECTION 33 49 00

SECTION 34 41 16
TRAFFIC CONTROL EQUIPMENT

PART 1 – GENERAL

1.01 WORK INCLUDES

A. Layout, installation, maintenance and removal of temporary traffic control devices to prevent users of the off-site roadways and pedestrian-ways from entering the construction areas, and to direct them around the work zone.

B. Layout, furnish and install permanent signs as shown in the plans.

C. Remove, store and reinstall existing signs as shown in the plans or required by construction.

1.02 RELATED WORK (RESERVED)

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable portions of Articles 107, 701, 703 and 720 of IDOT's Standard Specifications for Road and Bridge Construction, the Supplemental Specifications and Recurring Special Provisions and IDOT's Highway Standards.

B. Conform to the IDOT Highway Standards included in the project details of these contract documents.

C. Applicable IDOT Highway Standards – Attached at end of this Section.

D. Conform to the Illinois Manual on Uniform Traffic Control Devices.

1.04 SUBMITTALS

A. Contractor to submit shop drawings prior to ordering and manufacturing any permanent signs.

PART 2 – PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

A. Temporary Traffic Control Devices: As specified in IDOT Highway Standard 701901.

B. Sign Panels: Furnish signs of the type, color and size shown in the plans or approved by the Owner, in accordance with Section 720.04 of IDOT's Standard Specifications, the

Manual on Uniform Traffic Control Devices and the manufacturer's instructions.

C. Posts: Furnish 2" square black powder coated telescoping tube steel posts with galvanized sign-mounting hardware for each sign.

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify existing conditions. Field verify underground utilities prior to sign installation. Primary utilities of concern of shallow depths are irrigation, electric, telephone, cable and gas.

B. Evaluate placement of traffic control devices in addition to the devices shown on the plans.

C. Consider flow of traffic adjacent to site.

D. Obtain required street and/or sidewalk closure permits from City.

E. Provide Owner & City with 72 hours' notice prior to initiating traffic control.

F. Verify sign locations will not conflict with landscaping or other obstructions.

G. Cost related to repair damaged surface and subsurface facilities shall be paid for by the Contractor at no additional expense to the Owner.

3.02 INSTALLATION

A. Implement traffic control devices to promote flow of traffic.

B. Ensure traffic control devices are visible at night.

C. Install signs as shown in the plans.

3.03 MAINTENANCE

A. Correct traffic control devices that fail or are shifted by traffic.

B. Adjust traffic control devices to respond to changes in traffic patterns and flow.

3.04 REMOVAL

A. Upon final completion of the project, remove all traffic control devices.

END SECTION 34 41 16