SECTION 000101
PROJECT TITLE PAGE

PROJECT MANUAL
FOR

KOLLAR POND - PHASE 1

LANDSCAPE ARCHITECT'S PROJECT NUMBER: 24255.

VILLAGE OF STREAMWOOD
555 E IRVING PARK RD
STREAMWOOD, IL 60107

ACCESS TO THE KOLLAR POND AREA IS BY PARKING IN THE POLICE STATION PARKING LOT AT 401 E. IRVING PK. RD. AND WALKING EAST ON THE SIDEWALK.

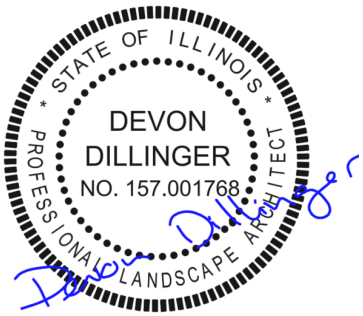
DATE: AUGUST 2026

PREPARED BY:
CONFLUENCE, INC.

END OF SECTION 000101

SECTION 000107
SEALS PAGE

LANDSCAPE ARCHITECT



CONFLUENCE, INC
DEVON DILINGER, PLA
325 W HURON STREET, SUITE 602
CHICAGO, ILLINOIS 60654
(312) 663-5494

DIV 00, DIV 01, 05 52 13, 10 14 00, 13 12 13, 32 14 13, 32 14 40, 32 15 40, 32 15 43, 32 32 16, 32 84 23, 32 91 19, 32 92 19, 32 92 23, 32 93 00, 32 93 35

ARCHITECT



EXPIRES 11/30/2026

GANNETT FLEMING ARCHITECTS, INC
KENNETH KORAB
180 N STETSON AVE, SUITE 3700
CHICAGO, IL 60642
(312) 432-4180

05 73 00, 06 15 33, 07 56 00, 09 96 00

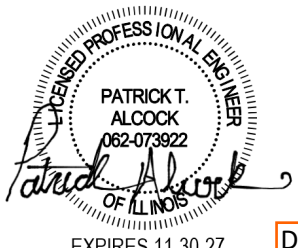
ARCHITECTURAL STRUCTURAL ENGINEER



GANNETT FLEMING ARCHITECTS, INC
BORIS GALINDO, PE
ONE PENN PLAZA, SUITE 630
NEW YORK, NY 10119
(212) 967-9833

03 20 10, 03 30 10, 05 12 00, 05 52 13, 31 32 00

ELETRICAL ENGINEER

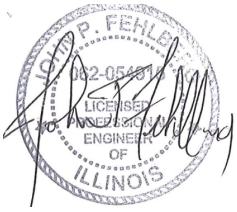


EXPIRES 11-30-27

PRIMERA
PAT ALCOCK, PE
550 W JACKSON BLVD #600
CHICAGO, IL 60661
(312) 606-0910

DIV 26

CIVIL ENGINEER



PRIMERA
JOHN FEHLBERG, PE
550 W JACKSON BLVD #600
CHICAGO, IL 60661
(312) 606-0910

31 10 00, 31 20 00, 31 23 18.11, 31 23 18.13,
31 30 00, 31 40 00, 31 41 00, 32 02 00, 32 11 00,
32 12 00, 32 13 00, 33 42 00, 33 46 00, 33 52 00

CIVIL STRUCTURAL ENGINEER



PRIMERA
CHANDANI BHAGAT
550 W JACKSON BLVD #600
CHICAGO, IL 60661
(312) 606-0910

03 10 00, 03 20 00, 03 30 00

END OF SECTION 000107

SECTION 000110
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01 40 00	**QUALITY REQUIREMENTS**
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01 50 00	**TEMPORARY FACILITIES AND CONTROLS**
01 56 39	**TREE RETENTION AND PROTECTION**
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03 10 00	**CONCRETE FORMING AND ACCESSORIES**
03 20 00	**CONCRETE REINFORCING**
03 20 10	**CONCRETE REINFORCING (ARCH)**
03 30 00	**CAST-IN-PLACE CONCRETE**
03 30 10	**CAST-IN-PLACE CONCRETE (ARCH)**
05 12 00	**STRUCTURAL STEEL FRAMING**
05 12 13	**ARCHITECTURALLY EXPOSED STRUCTURAL STEEL**
05 52 13	**PIPE AND TUBE RAILINGS**
05 73 00	**DECORATIVE METAL RAILINGS**
06 15 33	**WOOD AND PLASTIC DECKING AND BENCHES**
07 56 00	**COLD FLUID APPLIES WATERPROOFING**
09 96 00	**HIGH-PERFORMANCE COATINGS**
10 14 00	**MONUMENT SIGNAGE**
13 12 13	**FLOATING POND FOUNTAIN AND AERATOR**

26 05 00	**COMMON WORK RESULTS FOR ELECTRICAL**
26 05 19	**CONDUCTORS AND CABLES**
26 05 26	**GROUNDING AND BONDING**
26 05 33	**RACEWAYS AND BOXES**
26 05 53	**ELECTRICAL IDENTIFICATION**
26 05 73	**OVERCURRENT PROTECTIVE DEVICE SHORT CIRCUIT, COORDINATION AND ARC FLASH STUDY**
26 09 23	**LIGHTING CONTROL DEVICES**
26 09 43.23	**RELAY-BASED LIGHTING CONTROLS**
26 24 16	**PANELBOARDS**
26 27 26	**WIRING DEVICES**
26 28 16	**ENCLOSED SWITCHES AND CIRCUIT BREAKERS**
26 56 13	**LIGHT POLES AND STANDARDS**
26 56 19	**LED EXTERIOR LIGHTING**
31 10 00	**SITE CLEARING**
31 20 00	**EARTH MOVING**
31 23 18.11	**CLEAN CONSTRUCTION OR DEMOLITION DEBRIS DISPOSAL**
31 23 18.13	**CONTAMINATED SOIL GENERAL CONSTRUCTION DEMOLITION DEBRIS DISPOSAL**
31 30 00	**SOIL EROSION AND SEDIMENTATION CONTROL**
31 32 00	**STONE COLUMN GROUND IMPROVEMENT**
31 40 00	**TRENCHING**
31 41 00	**ACCEPTANCE OF BACKFILL**
32 02 00	**AGGREGATE**
32 11 00	**AGGREGATE BASE**
32 12 00	**ASPHALT PAVING**
32 13 00	**CONCRETE PAVING**
32 14 13	**PERMEABLE CONCRETE UNIT PAVERS**
32 14 40	**NATURAL STONE STEPS**
32 15 40	**LANDSCAPE BOULDERS**
32 15 43	**STABILIZED DECOMPOSED GRANITE PAVING**
32 32 16	**PRECAST MODULAR BLOCK RETAINING WALL**
32 84 23	**UNDERGROUND SPRINKLERS**
32 91 19	**LANDSCAPE GRADING**
32 92 19	**SEEDING**
32 92 23	**SODDING**
32 93 00	**PLANTS**
32 93 35	**AQUATIC PLANTS**
33 42 00	**STORM SEWER SYSTEM**
33 46 00	**SUBDRAINAGE**
33 52 00	**SANITARY SEWER SYSTEM**

SECTION 000115
LIST OF DRAWING SHEETS

PAGE	NAME
GN000	COVER
GN001	NOTE & CODE REVIEW
LD100	SITE PREPARATION PLAN
LS100	HARDSCAPE PLAN
LP100	PLANTING PLAN
LP101	PLANTING PLAN ENLARGEMENT - NORTH
LP102	PLANTING PLAN ENLARGEMENT - SOUTH
LS300	SITE SECTIONS
LS301	SITE SECTIONS
LS302	SITE SECTIONS
LS303	SITE SECTIONS
LS500	SITE DETAILS
LS501	PLANTING DETAILS
C001	CIVIL GENERAL NOTES & MWRD ROUTING MAP
C100	EXISTING CONDITIONS PLAN
C200	EROSION AND SEDIMENT CONTROL PLAN
C300	SUGGESTED PHASING/DEWATERING PLAN
C400	GEOMETRY PLAN
C500	UTILITY PLAN
C600	GRADING PLAN
C700	CIVIL DETAILS
C701	CIVIL DETAILS
C702	CIVIL DETAILS
C703	CIVIL DETAILS
C704	CIVIL DETAILS
C705	CIVIL DETAILS
E000	ELECTRICAL GENERAL NOTES
E200	SITE LIGHTING PLAN PHASE 1
E200	SITE LIGHTING PLAN PHASE 2
E500	ELECTRICAL SCHEDULES PHASE 1
E500	ELECTRICAL SCHEDULES PHASE 2
E501	ELECTRICAL SECTIONS AND DETAILS
S-100	STRUCTURAL GENERAL NOTES
S-200	STRUCTURAL FOUNDATION PLANS AND SECTIONS
S-201	LIGHT POLE FOUNDATION DETAILS
A-100.1	SITE PLAN
A-101.1	FLOOR PLAN - LEVEL 1
A-200.1	ELEVATIONS

A-201.1	**ENLARGED PLAN - COMPOSITE DECKING INFILL**
A-300.1	**RENDERING - FOR INFORMATION ONLY**
A-301.1	**RENDERING - FOR INFORMATION ONLY**
A-401.1	**DETAILS**
AD-101.2	**DEMOLITION PLAN - LEVEL 1**
A-100.2	**SITE PLAN**
A-101.2	**FLOOR PLAN - LEVEL 1**
A-102.2	**ROOF PLAN**
A-200.2	**ELEVATIONS**
A-201.2	**ENLARGED PODS @ TOP OF DECK**
A-300.2	**RENDERING FOR INFORMATION ONLY**
A-301.2	**RENDERING FOR INFORMATION ONLY**
A-302.2	**RENDERING FOR INFORMATION ONLY**
A-303.2	**RENDERING FOR INFORMATION ONLY**
A-401.2	**DETAILS**
SB-001	**STRUCTURAL NOTES**
SB-101.1	**STRUCTURAL FOUNDATION PLAN**
SB-102.1	**STRUCTURAL DECK FRAMING PLAN**
SB-102.2	**STRUCTURAL DECK FRAMING PLAN PHASE 2**
SB-103.2	**STRUCTURAL CNAOPY ROOF FRAMING PLAN**
SB-201.2	**STRUCTURAL SECTIONS - CANOPY ROOF**
SB-501.1	**STRUCTURAL DETAILS - FOUNDATION**
SB-502.1	**STRUCTURAL DETAILS - STEEL**
SB-502.2	**STRUCTURAL DETAILS - STEEL PHASE 2**
SB-503.2	**STRUCTURAL DETAILS - CANOPY COLUMN I**
SB-504.2	**STRUCTURAL DETAILS - CANOPY COLUMN II**

END OF SECTION 000115

SECTION 001113
ADVERTISEMENT FOR BIDS

FROM:

1.01 THE OWNER (HEREINAFTER REFERRED TO AS OWNER):

A. Village of Streamwood

B. Address:
565 S Bartlett Rd
Streamwood, IL, 60107

1.02 AND THE LANDSCAPE ARCHITECT (HEREINAFTER REFERRED TO AS LANDSCAPE ARCHITECT):

A. Confluence, Inc.

B. Address:
325 W Huron Street, Suite 602
Chicago, Illinois 60654

1.03 DATE: SEPTEMBER 8, 2026

1.04 TO: POTENTIAL BIDDERS

A. Your firm is invited to submit an offer under seal to Owner for construction of a park located at:
555 E Irving Park Rd
Streamwood, Illinois60107

Before 3 pm local standard time on the 22 day of September, 2026, for:

B. Project: Kollar Pond

C. Landscape Architect's Project Number: 24255.

D. All bidders are required to prequalify to the requirements described in Document 002113 - Instructions to Bidders.

E. Project Description: The project generally consists of improvements to Kollar Pond and the surrounding park area in the Village of Streamwood, Illinois. Work includes renovation, expansion, and deepening of the existing pond; pond-edge improvements; grading, excavation, storm drainage, utilities, erosion control, and site restoration; construction of pedestrian paths, paved gathering areas, decks, steps, walls, seating areas, gateway features, amphitheater improvements, and related site structures; installation of lighting, landscaping, irrigation, site furnishings, interactive sculptural elements, and other associated improvements shown in the Contract Documents.

F. Bid Documents for a Stipulated Price contract may be obtained from BHFX Digital Imaging's PLAN ROOM; https://www.bhfxplanroom.com/on the 8 day of September, 2026 after 1 pm local time.

G. Your offer will be required to be submitted under a condition of irrevocability for a period of 90 days after submission.

H. The Owner reserves the right to accept or reject any or all offers.

1.05 SIGNATURE

A. For: Village of Streamwood

B. By: MATT MANN

1. Signed: _____

2. (Authorized signing officer)

END OF SECTION 001113

SECTION 002113
INSTRUCTIONS TO BIDDERS

FORM OF INSTRUCTIONS TO BIDDERS

1.01 RELATED DOCUMENTS

A. Document 001113 - Advertisement for Bids.

B. Document 004100 - Bid Form.

C. Document 004202 - Bidder Sworn Work History Statement Form.

D. Document 004203 - Bidder Certification Form.

E. Document 004201 - Bid Bond - Form ConfluJ103.

F. Document 004336 - Proposed Subcontractors Form.

G. Document 004322 - Unit Prices Form.

H. Document 004323 - Alternates Form.

INVITATION

2.01 BID SUBMISSION

A. Bids signed and under seal, executed, and dated will be **received at** the office of the Owner at 565 S Bartlett Rd, Streamwood, IL 60107 before 3 p.m. local standard time on the 22 day of September 2026.

B. Offers submitted after the above time shall be returned to the bidder unopened.

C. Offers will be opened publicly immediately after the time for receipt of bids.

2.02 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

A. The Work generally consists of improvements to Kollar Pond and the surrounding park area, including renovation, expansion, and deepening of the existing pond; grading and excavation; storm drainage and utility improvements; erosion and sediment control; pedestrian walks and paved gathering areas; decks, steps, walls, seating areas, gateway features, amphitheater improvements, lighting, landscaping, irrigation, site furnishings, interactive sculptural elements, and related site improvements as indicated in the Contract Documents.

2.03 CONTRACT TIME

A. Identify Contract Time in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the commencement date.

BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 DEFINITIONS

A. Bid Documents: Contract Documents supplemented with Invitation To Bid, Instructions to Bidders, Information Available to Bidders, Bid Form Supplements To Bid Forms and Appendices identified.

B. Bid, Offer, or Bidding: Act of submitting an offer under seal.

C. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

3.02 CONTRACT DOCUMENTS IDENTIFICATION

A. Contract Documents are identified as Project Number 24255 CH, as prepared by Landscape Architect, and with contents as identified in the Table of Contents.

3.03 AVAILABILITY

A. Bid documents may be obtained at **BHFX Digital Imaging ONLINE PLAN ROOM**: https://www.bhfxplanroom.com/.

B. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

C. Bidder is responsible for any downloads or printing costs related to bidding documents.

3.04 INQUIRIES/ADDENDA

A. Direct questions to Devon Dillinger, PLA, email; ddillinger@thinkconfluence.com.

B. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.

C. Verbal and email answers are not binding on any party. Official answers are released in addenda.

D. Clarifications requested by bidders must be in writing not less than 5 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be posted where the original bid documents were obtained .

3.05 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

A. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 10 days before receipt of bids.

B. Submit substitution requests by completing the form in Section 004325 - Substitution Request Form - During Procurement; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

SITE ASSESSMENT

4.01 SITE EXAMINATION

A. Examine the project site before submitting a bid.

4.02 PREBID CONFERENCE

A. A bidders conference has been scheduled for 3 p.m. on the 16 day of September 2026 virtually via ZOOM **Meeting ID: 844 3647 8680**
https://us02web.zoom.us/j/84436478680?pwd=B2N7fCPGXchWYzh499rBav9GRVyT6I.1.
PASSCODE: 662382

B. All general contract bidders are invited.

C. Representatives of Landscape Architect will be in attendance.

D. Information relevant to the Bid Documents will be recorded in Addenda, issued to plan room listed in section 3.03 above..

QUALIFICATIONS

5.01 EVIDENCE OF QUALIFICATIONS

A. The Bidder shall fully complete, sign, notarize, and submit the Bidder Sworn Work History Statement provided in the Bid Documents, Document 004201 - Bidder Sworn Work History Statement Form.. The statement shall include the Bidder’s nature of business, years in business, predecessor organizations, current business licenses, experience on comparable public improvement projects, cumulative contract experience, and proposed subcontractors. The Bidder shall identify at least 3 comparable public improvement projects completed within the previous 5 years and provide current references for each project.

B. The Bidder shall fully complete, sign, notarize, and submit the Bidder’s Certification provided in the Bid Documents, Document 004202 - Bidder Certification Form.

C. A joint venture shall submit a separate Bidder’s Sworn Work History Statement for the joint venture and for each party to the joint venture.

D. The Owner reserves the right to verify information contained in the qualification documents, contact references, request supplemental information, and consider the Bidder’s experience, prior performance, available personnel, equipment, financial capacity, and ability to complete the Work within the Contract Time.

E. Failure to submit complete, signed, and notarized qualification and certification documents with the Bid may be cause for rejection of the Bid as nonresponsive.

BID SUBMISSION

6.01 SUBMISSION PROCEDURE

A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.

B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Owner's name on the outside.

C. Improperly completed information, irregularities in security deposit, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.

D. An abstract summary of submitted bids will be made available to all bidders following bid opening.

6.02 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.

BID ENCLOSURES/REQUIREMENTS

7.01 BID SECURITY

A. Bids shall be accompanied by a security deposit as follows:
   1. Bid Bond of a sum no less than 10 percent of the Bid Amount.

B. Endorse the Bid Bond in the name of the Owner as obligee, signed and sealed by the principal (Contractor) and surety.

C. The security deposit will be returned after delivery to the Owner of the required Performance and Payment Bond(s) by the accepted bidder.

D. Include the cost of bid security in the Bid Amount.

E. If no contract is awarded, all security deposits will be returned.

7.02 BID FORM REQUIREMENTS

A. Submit the following documents with the Bid.
   1. 004100 - Completed and signed Bid Form.
   2. 004201 - Bid Bond - Form ConfluJ103.
   3. 004202 - Bidder’s Sworn Work History Statement, signed and notarized.
   4. 004203 - Bidder’s Certification, signed and notarized.
   5. 004322 - Unit Prices Form.
   6. 004323 - Alternates Form.
   7. 004336 - Proposed subcontractor information.

7.03 BID FORM SIGNATURE

A. The Bid Form shall be signed by the bidder, as follows:
   1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
   2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
   3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.

4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

7.04 SELECTION AND AWARD OF ALTERNATES

A. Bids will be evaluated on the total of the base bid price and all of the Alternates. After determination of the successful bidder, consideration will be given to which Alternates will be included in the Work.

OFFER ACCEPTANCE/REJECTION

8.01 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of 90 days after the bid closing date.

8.02 ACCEPTANCE OF OFFER

A. Owner reserves the right to accept or reject any or all offers.

END OF SECTION 002113

SECTION 003100
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

B. Geotechnical Report:
   1. Entitled Geotechnical Engineering Services Report, dated December 4, 2023. Rubino Project # G23.178.
   2. Addendum #1 Geotechnical Report: Entitled Additional Geotechnical Engineering Services Report Addendum, dated September 2, 2025. Rubino Project # G23.178_ADD1.
   3. Addendum #1 Geotechnical Report: Entitled Additional Geotechnical Engineering Services Report Addendum 2, dated November 7, 2025. Rubino Project # G23.178_ADD2.
   4. Original copy is available for inspection at Owner's offices during normal business hours.
   5. Bidder can contact Devon Dillinger, PLA at ddillinger@thinkconfluence.com for a PDF copy via email.
   6. These reports identify properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Landscape Architect.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 OBTAINMENT OF PERMITS

A. Contractor to obtain the following required permits, at no cost to Owner:

B. Building Permit Procedures: When required to obtain this permit:
   1. Complete and file permit application(s) with appropriate agency.
      a. Submit application within five days of the Notice to Proceed.
   2. Pay required fees.
   3. Advise Landscape Architect if submission of modified documents is necessary to have the authorities having jurisdiction complete the plan review and approval process. Submit modified documents expeditiously.
   4. Do not commence execution of any item of work for which a permit has not been obtained.

END OF SECTION 003100

SECTION 004100
BID FORM

THE PROJECT AND THE PARTIES

1.01 TO:

A. Village of Streamwood (Owner)

1.02 FOR:

A. Project: Kollar Pond

B. Project Number: 24255
565 E Irving Park Road
Streamwood, Illinois60107

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)

A. Bidder's Full Name _____
1. Address _____
2. City, State, Zip_____

1.05 OFFER

A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Bid Documents prepared by Confluence, Inc for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Price of:

B. _____
_____ dollars
($_____), in lawful money of the United States of America.

C. We have included the required performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.
1. The cost of the required performance assurance bonds is _ _____ _dollars ($_____), in lawful money of the United States of America.

D. All applicable federal taxes are included and State of IL taxes are included in the Bid Price.

1.06 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for thirty days from the bid closing date.

B. If this bid is accepted by Owner within the time period stated above, we will:
1. Execute the Agreement within seven days of receipt of Notice of Award.

C. In the event our bid is not accepted within the time stated above, the required Bid Security shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

1.07 CONTRACT TIME

A. If this Bid is accepted, we will:

B. Complete the Work in _____ calendar weeks from Notice to Proceed. (Bidder to enter number of weeks.)

1.08 CHANGES TO THE WORK

A. On work deleted from the Contract, our credit to Owner shall be Architect-approved net cost plus _____ of the overhead and profit percentage noted above.

1.09 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Price.
   1. Addendum # _____ Dated _____.
   2. Addendum # _____ Dated _____.
   3. Addendum # _____ Dated _____.
   4. Addendum # _____ Dated _____.
   5. Addendum # _____ Dated _____.

1.10 BID FORM SUPPLEMENTS

A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Document 004322 - Unit Prices Form: Include a listing of unit prices specifically requested by Contract Documents.
   2. Document 004323 - Alternates Form: Include the cost variations to the Bid Sum applicable to the Work as described in Section 012300 - Alternates.
   3. Document 004201 - Bidder's Sworn Work Hisotry Statement Form.

1.11 BID FORM SIGNATURE(S)

A. The Corporate Seal of

B. _____

C. (Bidder - print the full name of your firm)

D. was hereunto affixed in the presence of:

E. _____

F. (Authorized signing officer, Title)

G. (Seal)

H. _____

I. (Authorized signing officer, Title)

1.12 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.

END OF SECTION 004100

CONFLUENCE

BID BOND FORM

FORM J103 – BOND

The CONSTRUCTOR, _____ has submitted a Bid to the OWNER, _____(the "OWNER") for the _____(the "Project") in accordance with the Bidding Documents, including Drawings and Specifications prepared by **CONFLUENCE, INC**. (the "DESIGN PROFESSIONAL").

By virtue of this Bid Bond (the "Bond"), the CONSTRUCTOR as Principal and _____ _____as Surety ("Surety"), are bound to the OWNER as Obligee in the maximum amount _____ _____, Dollars ($_____) (the "Bond Sum"). The CONSTRUCTOR and Surety hereby bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

1. If the Obligee shall accept the bid of the CONSTRUCTOR, the CONSTRUCTOR shall enter into an Agreement with the Obligee in accordance with the terms of such Bid.
2. CONSTRUCTOR shall procure such bond or bonds as are specified in the Contract Documents for the faithful performance of the Work and for the prompt payment of labor and materials furnished in the performance of the Work.
3. If the CONSTRUCTOR fails to enter such Agreement and give such bonds, the CONSTRUCTOR shall pay to the Obligee the difference between the amount of CONSTRUCTOR's bid and the amount of such agreement the Obligee in good faith executed with another Party to perform the Work covered by CONSTRUCTOR's Bid, not to exceed the Bond Sum stated above.
4. If the CONSTRUCTOR shall fulfill its obligation under Articles 1 through 3, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

This Bond is entered into as of _____ (date)

SURETY: _____ (seal)

BY:_____

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: _____

CONSTRUCTOR: _____ (seal)

BY:_____

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: _____

(Additional signatures, if any, appear on the attached page)

END J102

00 42 02 - Return with Bid

BIDDER'S SWORN WORK HISTORY STATEMENT

_____
NAME OF COMPANY

_____
NAME OF DEPONENT

being first duly sworn on oath, deposes and states that all statements made in this Sworn Work History Statement are made on behalf of the undersigned Bidder in support of its Bidder's Proposal for the project identified as **2026 Kollar Pond Phase 1** and that Deponent is authorized to make them.

Deponent also states that the Bidder has carefully prepared, reviewed and checked this Sworn Work History Statement and that the statements contained in this Sworn Work History Statement are true and correct.

IF NECESSARY FOR FULL DISCLOSURE, ADD SEPARATE SHEETS

Joint Ventures must submit separate Sworn Work History Statements for the Joint Venture and for each signatory to the Joint Venture Agreement.

1. Nature of Business
   State the nature of the Bidder's business:

   _____

2. Composition of Work

   During the past five years, Bidder's work has consisted of:

_____ % Federal	_____ % As Contractor	_____ % Bidder=s Forces
_____ % Other Public	_____ % As Subcontractor	_____ % Subcontractors
_____ % Private	_____ % Materials	

3. Years in Business

   State the number of years that Bidder, under its current name and organization, has been continuously engaged in the aforesaid business : _____ Years

Return with Bid

4. Predecessor Organizations

If Bidder has been in business for less than five years, list any predecessor organizations:

NAME	ADDRESS	YEARS

5. Business Licenses

List all business licenses currently held by Bidder:

ISSUING AGENCY *	TYPE	NUMBER	EXPIRATION

6. Related Experience

List three public improvement projects most comparable to this project that has been completed by Bidder, or its predecessors, in the past five years including the names of the municipal references:

	PROJECT ONE	PROJECT TWO	PROJECT THREE
Owner Name			
Owner Address			
Municipal Reference Name			
Phone Number			
Type of Work			
Awarded Amount			
Final Amount			
Completion Date			
Date Completed			

Return with Bid

7. Contract Quantitative Experience

   List the cumulative contract amounts of work completed over the past four years of business:

   2026: _____ 2025: _____

   2024: _____ 2023: _____

8. Proposed Subcontractors

   List proposed subcontractors upon which Bidder's Price Proposal is based:

Subcontractor Name	Class of Work	% of work	IDOT Qualified?

DATED this _____ day of _____ , 2026

Bidder/Deponent

By:_____

Title:_____

Attest/Witness

By:_____

Title:_____

Subscribed and Sworn to before me this _____ day of _____, 2026.

My Commission expires_____

_____

Notary Public

SEAL

00 42 03 - RETURN WITH BID

VILLAGE OF STREAMWOOD

BIDDER'S CERTIFICATION

Pursuant to 720 ILCS 5/33-E-1, et seq.
65 ILCS 5/11-42.1-1
30 ILCS 580/1
775 ILCS 5/1-10, et seq.

The undersigned, being a duly appointed and empowered official of the _____, duly sworn and under oath, hereby certifies:
(Company Name)

1. _____ is not barred by law from submitting a
(Company Name)
Proposal to the Village of Streamwood for the project contemplated herein because of a conviction for prior violations of either Illinois Compiled Statues, 720 ILCS/5-33E-3 (Bid Rigging) or 720 ILCS 5-33E-4 (Bid Rotating).

2. _____ is not delinquent in payment of any taxes to
(Company Name)
the Illinois Department of Revenue in accordance with 65 ILCS 5/11-42.1.

3. _____ provides a drug free workplace pursuant
(Company Name)
to 30 ILCS 580/1, et seq.

4. _____ is in compliance with the Illinois Human
(Company Name)
Rights Act 775 ILCS 5/1.101, et seq. including establishment and maintenance of sexual harassment policies and programs.

_____
Company

_____
Name

_____
Title

SUBSCRIBED AND SWORN to before me
this _____ day of _____ , 2023.

_____
Notary Public

SECTION 004322
UNIT PRICES FORM

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF UNIT PRICES REFERENCED IN THE BID SUBMITTED BY:

1.02 (BIDDER) _____

1.03 TO (OWNER): VILLAGE OF STREAMWOOD

1.04 DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

1.05 THE FOLLOWING UNIT PRICES SHALL BE USED FOR AUTHORIZED INCREASES OR DECREASES IN THE WORK AND SHALL BE ADMINISTERED IN ACCORDANCE WITH SECTION 012200 "UNIT PRICES." UNIT PRICES SHALL INCLUDE ALL COSTS IDENTIFIED IN SECTION 012200 AND SHALL REMAIN FIRM FOR THE DURATION OF THE CONTRACT.

UNIT PRICE LIST

2.01 ITEM DESCRIPTION UNIT UNIT VALUE TABLE

#	ITEM NAME	DESCRIPTION	UNIT	VALUE
1	BOULDER RETAINING WALLS	FURNISH AND INSTALL BOULDER RETAINING WALLS; RE: LS500	LF	$
2	AGGREGATE BASE COURSE, PARKING LOT	ADDITIONAL AGGREGATE BASE COURSE FOR PARKING LOT STABILIZATION	SF	$
3	AGGREGATE BASE COURSE, SIDEWALK	ADDITIONAL AGGREGATE BASE COURSE BELOW SIDEWALKS	SF	$
4	AGGREGATE BASE COURSE, BOULDER	ADDITIONAL AGGREGATE BASE FOR BOULDER STABILIZATION	SF	$
5	LOW MOW SEED MIX	FURNISH AND INSTALL PLANTING SEED MIX; RE: LS501	SF	$
6	ADDITIONAL EARTH EXCAVATION	EXCAVATE ADDITIONAL AUTHORIZED IN-PLACE SOIL	CY	$
7	SATURATED POND SOIL/SEDIMENT EXCAVATION	EXCAVATE AND HANDLE ADDITIONAL SATURATED POND SOIL OR SEDIMENT.	CY	$
8	LOADING AND HANDLING OF EXPORT SOIL	LOAD AND HANDLE AUTHORIZED SOIL FOR OFF-SITE HAULING	CY	$
9	OFF-SITE TRUCKING	OFF-SITE HAULING BY TRI-AXLE DUMP TRUCK, INCLUDING TRUCK AND DRIVER.	TRUCK-HOUR	$
10	CLEAN SOIL DISPOSAL	DISPOSE OF CLEAN EXCAVATED SOIL AT AN APPROVED FACILITY	TON	$
11	UNSUITABLE SOIL DISPOSAL	DISPOSE OF UNSUITABLE NONHAZARDOUS SOIL AT AN	TON	$

		APPROVED FACILITY		
12	**SATURATED POND SOIL/SEDIMENT DISPOSAL**	**DISPOSE OF NONHAZARDOUS SATURATED POND SOIL OR SEDIMENT AT AN APPROVED FACILITY**	**TON**	**$**
13	**IMPORTED COMMON FILL**	**FURNISH, PLACE, AND COMPACT APPROVED COMMON FILL**	**CY**	**$**
14	**IMPORTED STRUCTURAL FILL**	**FURNISH, PLACE, AND COMPACT APPROVED STRUCTURAL FILL**	**CY**	**$**
15	**IMPORTED TOPSOIL**	**FURNISH, PLACE, AND FINE GRADE APPROVED TOPSOIL**	**CY**	**$**
16	**24-INCH PVC STORM SEWER**	**FURNISH AND INSTALL 24-INCH PVC SDR 26 STORM SEWER.**	**LF**	**$**
17	**4-FOOT DIAMETER CATCH BASIN**	**FURNISH AND INSTALL COMPLETE 4-FOOT DIAMETER CATCH BASIN.**	**EA**	**$**
18	**5-FOOT DIAMETER CATCH BASIN**	**FURNISH AND INSTALL COMPLETE 5-FOOT DIAMETER CATCH BASIN**	**EA**	**$**
19	**6-FOOT DIAMETER CATCH BASIN**	**FURNISH AND INSTALL COMPLETE 6-FOOT DIAMETER CATCH BASIN**	**EA**	**$**
20	**43-INCH X 68-INCH ELLIPTICAL RCP REPLACEMENT**	**REMOVE EXISTING PIPE AND FURNISH AND INSTALL 43-INCH X 68-INCH ELLIPTICAL RCP.**	**LF**	**$**
21	**CRUSHED STONE BACKFILL**	**FURNISH, PLACE, AND COMPACT CRUSHED STONE BACKFILL**	**CY**	**$**
22	**RIPRAP**	**FURNISH AND INSTALL RIPRAP AND ASSOCIATED BEDDING**	**TON**	**$**

END OF SECTION 004322

SECTION 004323
ALTERNATES FORM

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF ALTERNATES REFERENCED IN THE BID SUBMITTED BY:

1.02 (BIDDER) _____

1.03 TO (OWNER): VILLAGE OF STREAMWOOD

ALTERNATES LIST

2.01 THE FOLLOWING AMOUNTS SHALL BE ADDED TO OR DEDUCTED FROM THE BID AMOUNT. REFER TO SECTION 012300 - ALTERNATES.

ALTERNATE # 1: CLEARING AND GRUBBING (DEDUCT) $ _____

ALTERNATE # 2: TREE REMOVAL (DEDUCT) $ _____

ALTERNATE # 3: SITE DEMOLITION (DEDUCT) $ _____

ALTERNATE # 4: NORMAL SOIL SPOIL (DEDUCT) $ _____

ALTERNATE # 5: SATURATED SOIL SPOIL (DEDUCT) $ _____

ALTERNATE # 6: MODULAR STORMWATER (DEDUCT) $ _____

ALTERNATE # 7: PARKING LOT (DEDUCT) $ _____

ALTERNATE # 8: CURB AND GUTTER (DEDUCT) $ _____

ALTERNATE # 9: POND FOUNTAIN (DEDUCT) $ _____

ALTERNATE # 10: HELICAL LIGHT POLE FOUNDATIONS ADD / (DEDUCT) $ _____

END OF SECTION 004323

SECTION 004336
PROPOSED SUBCONTRACTORS FORM

PARTICULARS

1.01 HEREWITHIN IS THE LIST OF SUBCONTRACTORS REFERENCED IN THE BID SUBMITTED BY:

1.02 (BIDDER) _____

1.03 TO (OWNER): VILLAGE OF STREAMWOOD

1.04 DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

1.05 THE FOLLOWING WORK WILL BE PERFORMED (OR PROVIDED) BY SUBCONTRACTORS AND COORDINATED BY US:

LIST OF SUBCONTRACTORS

WORK SUBJECT SUBCONTRACTOR NAME

A. _____
B. _____
C. _____
D. _____
E. _____
F. _____
G. _____
H. _____
I. _____
J. _____
K. _____
L. _____
M. _____
N. _____
O. _____
P. _____
Q. _____
R. _____
S. _____
T. _____
U. _____
V. _____
W. _____
X. _____
Y. _____
Z. _____

Add additional pages as needed

END OF SECTION 004336

SECTION 005000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 FORMS LISTED IN THIS SECTION ARE FOR USE BY THE BIDDER, CONTRACTOR, OWNER, AND LANDSCAPE ARCHITECT, AS APPLICABLE.

1.02 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

A. Procore.com forms are acceptable alternatives to any Confluence (AKA CONFLU) provided form.

1.03 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 005200 - Agreement Form for the Agreement and General Conditions.

1.04 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.

B. Pre-Award Forms:
   1. Bid Bond Form: CONFLU J102 FORM.
   2. Bid Addendum Form: CONFLU J200 FORM.
   3. Substitution Request Form (During Procurement): CONFLU J101 FORM.

C. Post-Award Certificates and Other Forms:
   1. Schedule of Values Form: CONFLU K701 FORM.
   2. Application for Payment Form: CONFLU K700 FORM.

D. Clarification and Modification Forms:
   1. Request for Interpretation Form: CONFLU K301 FORM.
   2. Substitution Request Form (During Construction): CONFLU K302 FORM.
   3. Request for Proposal Form: CONFLU K401 FORM.
   4. Change Order Form: CONFLU K402 FORM.

E. Construction Administration Forms
   1. Submittal Cover Form: CONFLU K100 FORM.
   2. Supplemental Instruction Form:CONFLU K300 FORM.
   3. Field Observation Report Form: CONFLU K500 FORM.
   4. Substantial Completion Punch List Form: CONFLU K501 FORM.
   5. Substantial Completion Certificate Form:CONFLU K502 FORM.
   6. Final Completion Punch List Form:CONFLU K503 FORM.

F. Closeout Forms:
   1. Certificate of Completion Form: CONFLU K504 FORM.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 005000

CONFLUENCE

SUBSTITUTION REQUEST (DURING PROCUREMENT):

FORM J101 – SUBSTITUTION REQUEST

PROJECT NAME:		REQUEST #:	
		FROM:	
TO:		DATE:	
		A/E PROJECT #:	
RE:		CONTRACT FOR:	
SPEC NAME:		DESCRIPTION:	
SECTION:		ARTICLE:	
PAGE:		PARAGRAPH:	
PROPOSED SUBSTITUTION:			
MANUFACTURER:		ADDRESS:	
TRADE NAME:		CITY, ST ZIP	,
PHONE:		MODEL NUMBER:	

Submitters are expected to provide complete and accurate data, clearly identifying all relevant sections of the documentation to facilitate evaluation. They should include a narrative detailing any necessary changes to the contract documents to accommodate the substitution and confirm that the proposal aligns with all project requirements without introducing delays or additional costs. All submissions must be delivered to the Landscape Architect or approving authority within the specified timeframe, ensuring that the proposal is thorough and well-supported.

PART 1 - THE SUBMITTER CERTIFIES:

- The proposed substitution has been thoroughly evaluated and meets or exceeds the quality, performance, and characteristics of the specified product.
- An equivalent warranty will be provided for the proposed substitution, comparable to the specified product's warranty.
- Identical maintenance services and replacement part availability, where applicable, are assured for the proposed substitution.
- The proposed substitution will not negatively impact other trades or delay the project schedule.
- The proposed substitution maintains all required dimensions and functional clearances.
- Any additional costs related to adjustments in building design, including design, detailing, and construction expenses arising from the substitution, will be covered.

PART 2 - CONTRACT CHANGE NARRATIVE, IF APPLICABLE:

PART 3 – SIGNATURE:

SUBMITTED BY:
SIGNED BY:
FIRM:
ADDRESS:
TELEPHONE:

PART 4 - A/E REVIEW AND ACTION:

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- ☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- ☐ Substitution rejected – Not approved.
- ☐ Substitution Request received too late – Not Approved.

SIGNED BY: DATE:

Supporting Data Attached:

☐ DRAWINGS ☐ PRODUCT ☐ DATA ☐ SAMPLES ☐ TESTS ☐ REPORTS ☐ OTHER

END J101

CONFLUENCE

BID BOND FORM

FORM J103 – BOND

The CONSTRUCTOR, _____ has submitted a Bid to the OWNER, _____(the "OWNER") for the _____(the "Project") in accordance with the Bidding Documents, including Drawings and Specifications prepared by **CONFLUENCE, INC**. (the "DESIGN PROFESSIONAL").

By virtue of this Bid Bond (the "Bond"), the CONSTRUCTOR as Principal and _____ _____as Surety ("Surety"), are bound to the OWNER as Obligee in the maximum amount _____ _____, Dollars ($_____) (the "Bond Sum"). The CONSTRUCTOR and Surety hereby bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

1. If the Obligee shall accept the bid of the CONSTRUCTOR, the CONSTRUCTOR shall enter into an Agreement with the Obligee in accordance with the terms of such Bid.
2. CONSTRUCTOR shall procure such bond or bonds as are specified in the Contract Documents for the faithful performance of the Work and for the prompt payment of labor and materials furnished in the performance of the Work.
3. If the CONSTRUCTOR fails to enter such Agreement and give such bonds, the CONSTRUCTOR shall pay to the Obligee the difference between the amount of CONSTRUCTOR's bid and the amount of such agreement the Obligee in good faith executed with another Party to perform the Work covered by CONSTRUCTOR's Bid, not to exceed the Bond Sum stated above.
4. If the CONSTRUCTOR shall fulfill its obligation under Articles 1 through 3, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

This Bond is entered into as of _____ (date)

SURETY: _____ (seal)

BY:_____

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: _____

CONSTRUCTOR: _____ (seal)

BY:_____

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: _____

(Additional signatures, if any, appear on the attached page)

END J102

CONFLUENCE

ADDENDUM #001

FORM J200 – BID ADDENDUM COVER SHEET

DATE:	XX-XX-2021		
PROJECT:	Full Project Name	PROJECT #:	00000
LOCATION:	City, State		
OWNER:		BID REQUEST #:	00000
CONSULTANT:	Confluence		
CONTACT:	Full Name Street Address City, ST ZIP Email@thinkconfluence.com phone		
BID SUBMISSION:	Sealed bids shall be received by _____, at _____, _____, _____, not later than _____ AM/PM, on _____, 20##.		

This Addendum forms a part of the Contract Documents and is issued prior to receiving bids for the project. The addendum modifies the original bidding documents dated **January ##, 20##** with amendments and additions noted below. The bidder shall note receipt and make acknowledgement of this addendum on the Bid Proposal, incorporating these provisions in the bid. All items in conflict with this addendum are hereby deleted.

This Addendum consists of X page(s), not including attachments.

ATTACHMENTS: List Attachments here.

Product Approvals

1. Item one
    a. Sub point

2. Item two
    a. Sub point

Project Manual

1. Item one
    a. Sub point

2. Item two
    a. Sub point

Drawings

1. Item one
    a. Sub point

2. Item two
    a. Sub point

End J200 – Addendum # 001

CONFLUENCE

SUBMITTAL TRANSMITTAL:

FORM K100 – SUBMITTAL COVER SHEET

SUPPLIER:		LOCATION:	
PROJECT:		DATE:	
		A/E PROJECT #:	

PART 1 - INFORMATION

TO (CONTRACTOR):		DATE:	
FROM (SUBCONTRACTOR):		SUBMITTAL NO:	
BY:		RESUBMISSION:	

QTY	REFERENCE, NUMBER	TITLE, DESCRIPTION, MANUFACTURER	SPEC. SECTION, PARAGRAPH, DRAWING DETAIL REFERENCE

- ☐ Submitted for review and approval
- ☐ Resubmitted for review and approval
- ☐ Substitution involved - Substitution request attached (use Form CONFLU J101)
- ☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
- ☐ Complies with contract requirements
- ☐ Will be available to meet construction schedule
- ☐ Items included in submission will be ordered immediately upon receipt of approval
- ☐ A/E review time included in construction schedule
- ☐ Other

PART 2 – GENERAL CONTRACTOR REVIEW

TO (A/E): _____ ATTN: _____

FROM (CONTRACTOR): _____ DATE REC'D BY CONTRACTOR: _____

BY: _____ DATE TRNSMT'D BY CONTRACTOR: _____

- ☐ Approved
- ☐ Approved as noted
- ☐ Revise / Resubmit
- ☐ Rejected / Resubmit
- ☐ One copy retained by sender

PART 3 – DESIGN TEAM REVIEW

TO (CONTRACTOR): _____ ATTN: _____

FROM (A/E): _____ DATE REC'D BY A/E: _____

BY: _____ DATE TRNSMT'D BY CONTRACTOR: _____

- ☐ Approved
- ☐ Approved as noted
- ☐ Revise / Resubmit
- ☐ Rejected / Resubmit
- ☐ No action taken or required
- ☐ Not required for review
- ☐ Provide file copy with corrections identified
- ☐ Reproducible copies only returned
- ☐ Point-by-point comparative data required to complete approval process
- ☐ Submission Incomplete / Resubmit
- ☐ Other
- ☐ One copy retained by sender

PART 4 - RECORD

TO (A/E): _____ ATTN: _____

FROM (CONTRACTOR): _____ DATE REC'D BY CONTRACTOR: _____

BY: _____ DATE TRNSMT'D BY CONTRACTOR: _____

Copies:

☐ OWNER ☐ CONSULTANTS ☐ ONE COPY RETAINED BY SENDER ☐ OTHER

END K100

CONFLUENCE

SUPPLEMENTAL INSTRUCTION # 001

FORM K300 – SI

ATTENTION:		DATE:	YYYY-MM-DD
COMPANY:		PROJECT:	
ADDRESS:		PROJECT #:	
CITY/STATE/ZIP:		ATTACHMENT:	
EMAIL:		# OF PAGES:	
COPY:			

Per the General Conditions, the work listed in this Supplemental Instruction shall be completed in accordance with the Contract Documents without change in Contract Sum or Project Time.

DESCRIPTION:

ITEM NO.1: Description of adjustment to construction drawing or specifications to be here here.

ITEM NO 2:

SENT BY: _____

NAME: Name
Title

END K300

CONFLUENCE

REQUEST FOR INFORMATION/INTERPRETATION

FORM K301 – RFI

PROJECT NAME:		RFI #:	###
PROJECT #::		ISSUE DATE:	YYYY-MM-DD
PRIME CONTRACTOR		REQ RETURN:	YYYY-MM-DD
FROM:	Contractor Name	TO:	A/E
SUBJECT:	Title	CO AUTHOR	Sub?

INSTRUCTIONS TO CONTRACTOR:

Form should be used by the contractor to address any discrepancies, unclear details, or missing information within the contract documents. It is essential to clearly identify the subject of the inquiry and provide a concise, specific description of the information being requested, including references to relevant sections of the project manual, drawings, or specifications. The completed form must be submitted to the designated reviewer following the established communication protocols, allowing adequate time for review and response to avoid unnecessary delays.

PART 1 – REFERENCE

PART 2 – REQUEST

PART 3 – SUGGESTION

PART 4 – ANSWER

- ☐ Suggestion Approved.
- ☐ Suggestion Not Approved. See comment.

COMMENT:

ANSWERED BY: _____

NAME: A/E Name
Title

END K301

CONFLUENCE

SUBSTITUTION REQUEST (DURING CONSTRUCTION):

FORM K302 – SUBSTITUTION REQUEST

PROJECT NAME:		REQUEST #:	
		FROM:	
TO:		DATE:	
		A/E PROJECT #:	
RE:		CONTRACT FOR:	
SPEC NAME:		DESCRIPTION:	
SECTION:		ARTICLE:	
PAGE:		PARAGRAPH:	
PROPOSED SUBSTITUTION:			
MANUFACTURER:		ADDRESS:	
TRADE NAME:		CITY, ST ZIP	,
PHONE:		MODEL NUMBER:	

This form is to be used for requesting substitutions after award and the project has commenced construction. All proposals must adhere to the specified substitution procedures outlined in the project contract.

PART 1 - THE SUBMITTER CERTIFIES:

Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product. Same warranty will be furnished for proposed substitution as for specified product. Same maintenance service and source of replacement parts, as applicable, is available. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule. Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived. Proposed substitution does not affect dimensions and functional clearances. Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

PART 2 - CONTRACT CHANGE NARRATIVE:

Provide a detailed narrative explaining changes to any construction schedules, coordination requirements, or additional costs resulting from this substitution request.

1) Differences between proposed substitution and specified product:

_____

_____

2) Reason for not providing specified item:

_____

_____

3) Proposed substitution affects other parts of Work:
   - ☐ No
   - ☐ Yes: Explain

_____

_____

4) Savings to Owner for accepting substitution: _____ ($ _____)

5) Proposed substitution changes Contract Time:

   - ☐ No
   - ☐ Yes [Add] [Deduct] _____ days.

   NOTE: Acceptance of substitution request by the Landscape Architect will require the Contractor to submit a change order request in accordance with the General Conditions of the Contract. ***Should the Owner reject the change order request, the Substitution Request is therefore rejected****, and the Contractor must comply with the requirements of the Contract Documents as if the request was rejected by the Landscape Architect.*

Supporting Data Attached:

☐ DRAWINGS ☐ PRODUCT ☐ DATA ☐ SAMPLES ☐ TESTS ☐ REPORTS ☐ OTHER

PART 3 – SUBMITTER SIGNATURE:

SUBMITTED BY: _____

SIGNED BY: _____

FIRM: _____

ADDRESS: _____

_____

TELEPHONE: _____

PART 4 - A/E REVIEW AND ACTION:

- ☐ Substitution Approved
- ☐ Substitution Approved as Noted
- ☐ Substitution Rejected
- ☐ Substitution Rejected, Request Received Too Late

SIGNED BY: DATE:

END K302

CONFLUENCE

PROPOSAL REQUEST FORM

FORM K401 – PR

ATTENTION:		PR #:	
COMPANY:		DATE:	YYYY-MM-DD
ADDRESS:		PROJECT:	
CITY/STATE/ZIP:		PROJECT #:	
		# OF PAGES:	

Please submit an itemized quotation for changes to the Contract Sum and/or Time incidental to proposed modifications to the Contract Documents described herein. All conditions of the Contract shall apply to this Change unless specifically stated otherwise. The monetary and time compensation provided by this Change fully compensate the CONSTRUCTOR for the work covered by the change and for the accumulated effect that this change has on the entire scope of the work.

THIS IS NOT A CHANGE ORDER NOR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED HEREIN. If accepted, a Change Order (CO) will be issued.

PART 1 – DESCRIPTIONS:

ITEM NO.1: Description of adjustment to construction drawing or specifications to be here.

ITEM NO 2: Add more lines as needed.

ITEM NO 3: Add more lines as needed.

PART 2 – CONTRACTOR PRICE:

Net Amount of This Proposed Change (Add) (Deduct) (No Change) _____

Net Change in Calendar Days Due to Proposed Change (Add) (Deduct) (No Change) _____

CONSTRUCTOR SIGNATURE

SIGNED BY: DATE:

PART 3 - A/E REVIEW AND ACTION:

- ☐ Recommend Acceptance
- ☐ DO NOT Recommend Acceptance
- ☐ Revise Based on Comments
- ☐ Other

A/E SIGNATURE

SIGNED BY: DATE:

PART 4 - OWNER REVIEW AND ACTION:

- ☐ Acceptance
- ☐ DO NOT Accept
- ☐ Other

OWNER REP SIGNATURE

SIGNED BY: DATE:

END K401

CONFLUENCE

CONSTRUCTION OBSERVATION REPORT #____

FORM K500 – OB REPORT

ATTENTION:		DATE:	
COMPANY:		PROJECT:	
ADDRESS:		PROJECT #:	
CITY/STATE/ZIP:		INSPECTOR:	
TIME:		WEATHER:	
TEMP. RANGE:		% COMP.	

COPY:

OBSERVATIONS:
THE FOLLOWING ITEMS WERE NOTED DURING THE ON-SITE INSPECTION OF THE IDENTIFIED PORTION OF THE WORK AND DOES NOT NECESSARILY INDICATE ALL THE WORK REQUIRED TO FULFILL THE CONTRACT REQUIREMENTS. ANY DISPUTES REGARDING RESPONSIBILITY MUST BE SUBMITTED IN WRITING WITHIN 5 DAYS OF RECEIPT OF THIS REPORT TO THE LANDSCAPE ARCHITECT FOR EVALUATION AND/OR REASSIGNMENT.

Photo	**Description of item**
Add photo	*Add description*
	Add more rows as needed

INFORMATION OR ACTION REQUIRED:

1) List items as needed

SENT BY: _____

NAME: A/E Name
Title

CONFLUENCE

SUBSTANTIAL COMPLETION REVIEW

FORM K501 – SUBSTANTIAL PUNCH LIST

PROJECT:	Project Name	PROJECT #:	00000
DATE / TIME:	XX-XX-2021 / X:XX am	CONTRACTOR:	Contractor Name
OWNER:	Owner Name		
ATTENDEES:	Name - Representing		Name - Representing
COPY:	Name - Representing		Name - Representing

Per the specifications, the contractor shall promptly correct incomplete or rejected as identified on the following list. All work shall be completed promptly, except for factors beyond the contractor's control. If a delay is requested for an item, please notify the Architect in writing.

In the Status column, mark all completed items with an 'X' and delayed items with a 'D'.
Return one signed copy of this report to Confluence.

	ITEM ID	DESCRIPTION	LOCATION	STATUS / DATE
GENERAL SITE	1			
	2			
	3			
	4			
	5			
ARCHITECTURE	6			
	7			
	8			
	9			
	10			
	11			
SCOPE OF WORK	12			
	13			
	14			
	15			

16			
17	Insert additional rows to the table as necessary		

WARRANTY / MAINTENANCE	
	Plant Warranty: 00 months from date of Project Substantial Completion ending Month, date, year. Plant Maintenance: 00 days/months from Project Substantial Completion, ending Month, date, year. Plant maintenance includes _____, _____, _____. Turf Maintenance: 00 days/months from Project Substantial Completion and accepted by the Owner, ending Month, date, year . Turf maintenance includes _____, _____, _____. Irrigation Warranty: 00 months from date of Project Substantial Completion ending Month, date, year

CONTRACTOR SIGNATURE
The above items have been completed or delayed as noted

SENT BY:
NAME: A/E Name
Title

NAME: _____

TITLE: _____

DATE: _____

END K501

thinkconfluence.com

CONFLUENCE

SUBSTANTIAL COMPLETION CERTIFICATE

FORM K503 – SUB COMP CERTIFICATE

PROJECT: _____ PROJECT #: _____

DATE / TIME: _____ CONTRACTOR: _____

OWNER: _____

ATTN: _____ _____

_____ _____

_____ _____

COPY:

CERTIFICATE

This certificate confirms that the _____ project, located at _____, has reached substantial completion as of _____. The work has been reviewed and found to be substantially complete in accordance with the terms and conditions of the contract documents, allowing the owner to use or occupy the project while the outstanding work or deficiencies are completed.

Outstanding Work or Deficiencies

Please refer to the **FINAL REVIEW PUNCH LIST** (issued on _____) for outstanding work or deficiencies that need to be completed before the project can be closed out.

Warranties and Guarantees

The warranty period for the work described in the contract shall commence on the date of substantial completion, subject to the terms outlined in the project contract.

CONTRACTOR SIGNATURE

Acknowledgment of Receipt of Certificate and Final Completion Punch List.

SENT BY: _____ NAME: _____

NAME: A/E Name

Title

TITLE: _____

DATE: _____

END K503

CONFLUENCE

FINAL COMPLETION REVIEW

FORM K503 – FINAL PUNCH LIST

PROJECT:	Project Name	PROJECT #:	00000
DATE / TIME:	XX-XX-2021 / X:XX am	CONTRACTOR:	Contractor Name
OWNER:	Owner Name		
ATTENDEES:	Name - Representing		Name - Representing
COPY:	Name - Representing		Name - Representing

Per the specifications, the contractor shall promptly correct incomplete or rejected as identified on the following list. All work shall be completed promptly, except for factors beyond the contractor's control. If a delay is requested for an item, please notify the Architect in writing.

In the Status column, mark all completed items with an 'X' and delayed items with a 'D'.
Return one signed copy of this report to Confluence.

	ITEM ID	DESCRIPTION	LOCATION	STATUS / DATE
GENERAL SITE	1			
	2			
	3			
	4			
	5			
ARCHITECTURE	6			
	7			
	8			
	9			
	10			
	11			
SCOPE OF WORK	12			
	13			
	14			
	15			

16			
17	Insert additional rows to the table as necessary		

WARRANTY / MAINTENANCE	
	Plant Warranty: 00 months from date of Project Substantial Completion ending Month, date, year. Plant Maintenance: 00 days/months from Project Substantial Completion, ending Month, date, year. Plant maintenance includes _____, _____, _____. Turf Maintenance: 00 days/months from Project Substantial Completion and accepted by the Owner, ending Month, date, year . Turf maintenance includes _____, _____, _____. Irrigation Warranty: 00 months from date of Project Substantial Completion ending Month, date, year

CONTRACTOR SIGNATURE
The above items have been completed or delayed as noted

SENT BY:
NAME: A/E Name
Title

NAME: _____

TITLE: _____

DATE: _____

END K503

thinkconfluence.com

CONFLUENCE

CERTIFICATE OF COMPLETION

FORM K504 – COMP CERTIFICATE

PROJECT: _____ PROJECT #: _____

DATE / TIME: _____ CONTRACTOR: _____

OWNER: _____

ATTN: _____ _____

_____ _____

_____ _____

COPY:

COMPLETION CERTIFICATE

This certificate confirms that the **[Project Name]** project, located at **[Project Location]**, has reached **FINAL COMPLETION** as of **[Completion Date]**. The work has been reviewed, inspected, and verified as fully complete in accordance with the terms and conditions of the contract documents. The certificate further acknowledges that:

- **All work is complete**, including the resolution of any items identified during the final inspection or punch list review.
- **Final inspections** confirm that the project meets the standards and specifications outlined in the contract documents.
- **The owner has formally accepted** the project as complete.
- **Final payment** has been made, including the release of retainage (if applicable), and all financial matters have been settled.
- **Closeout documents** such as: as-built drawings, operation and maintenance manuals, and warranties have been submitted.

This certificate constitutes the final and complete discharge of all obligations under the contract between the owner and the contractor. The contract is hereby terminated in its entirety, and no further claims or liabilities shall arise from the terms of the agreement, except as expressly stated in the warranties or guarantees provided therein.

This document serves as the official acknowledgment that the contractor has fulfilled all contractual obligations and that the project is ready for its intended use.

CONTRACTOR SIGNATURE

Acknowledgment of Receipt of Certificate.

SENT BY:
NAME: A/E Name
Title

NAME: _____

TITLE: _____

DATE: _____

END K504

CONFLUENCE

CONTRACTOR APPLICATION AND CERTIFICATION FOR PAYMENT FORM

FORM K700 – PAY APP

PROJECT:	NAME	APP NO.	###
TO OWNER:	Title	PERIOD TO:	###
CITY/STATE/ZIP:	Address	PROJECT #:	#####
FROM CONTRACTOR:	Title	CONTRACT DATE:	YYYY-MM-DD
CITY/STATE/ZIP:	Address	DOC DATE:	YYYY-MM-DD
VIA LANDSCAPE ARCHITECT:	Title	# OF PAGES:	
CITY/STATE/ZIP:	Address		
DISTRIBUTION TO:	☐ OWNER ☐ LANDSCAPE ARCHITECT	☐ CONTRACTOR ☐ OTHER :	

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.

1. ORIGINAL CONTRACT TOTAL	$0.00
2. NET CHANGE BY CHANGE ORDERS (EXHIBIT 'A' LINE 4)	$0.00
3. CONTRACT TOTAL TO DATE (LINE 1 ± 2)	$0.00
4. SUBTOTAL COMPLETED & STORED TO DATE	$0.00
5. RETAINAGE	$0.00
6. TOTAL EARNED LESS RETAINAGE (LINE 4 LESS 5)	$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (LINE 6 FROM PRIOR CERTIFICATE)	$0.00
8. **CURRENT PAYMENT DUE**	$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (LINE 3 LESS LINE 6)	$0.00

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

CONTRACTOR SIGNATURE:

SENT BY		DATE	

LANDSCAPE ARCHITECT'S CERTIFICATE FOR PAYMENT

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

AMOUNT CERTIFIED	$0.00

LANDSCAPE ARCHITECT SIGNATURE:

SENT BY		DATE	

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

EXHIBIT 'A' - CHANGE ORDER SUMMERY

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
1. TOTAL PREVIOUS APPROVED	$0.00	$0.00
2. TOTAL APPROVED THIS PERIOD	$0.00	$0.00
3. SUBTOTAL	$0.00	$0.00
4. NET CHANGES BY CHANGE ORDER	$0.00	

END EXHIBIT 'A'

END K700

SECTION 005200
AGREEMENT FORM

PART 1 GENERAL

1.01 FORM OF AGREEMENT

1.02 A DRAFT AGREEMENT TO BE EXECUTED IS ATTACHED FOLLOWING THIS PAGE.

1.03 RELATED REQUIREMENTS

A. Section 007200 - General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 005200

DRAFT C O N T R A C T

THIS CONTRACT ENTERED INTO THIS _____ day of _____, 20___ between_____ ("Contractor") and the Village of Streamwood, a municipal corporation of the State of Illinois ("Village"), in consideration of the following and other valuable consideration the sufficiency of which is hereby acknowledged, the Village and Contractor agree as follows:

1. The Village of Streamwood has found it to be in the best interests of the Village to _____.

2. Contractor has submitted a proposal to _____. Such proposal dated _____, including all terms, conditions, requirements and specifications contained therein are incorporated herein as "Exhibit A" and expressly made a part of this agreement. In the event any inconsistent terms are contained in this agreement and in "Exhibit A," the terms of this agreement shall control. The bid specifications are (attached hereto) **OR** (are available for review at the Streamwood Village Hall).

3. Contractor agrees to complete such work in a good and workmanlike manner in accordance with the plans and specifications attached hereto.

4. The Contractor certifies that the Contractor is not delinquent in the payment of taxes to the Illinois Department of Revenue in accordance with 65 ILCS 5/11-42.1-1.

5. Contractor certifies that it is not barred from bidding on state, municipal or other contracts by reason of Sections 33E-3 (bid rigging) or 33E-4 (bid totaling) of the Criminal Code of 1961 (720 ILCS 5/33E-3 and 5/33E-4), and further certifies that it is not barred from bidding on State, municipal and other contracts by reason of conviction of State laws regarding bid rigging or bid rotation.

6. The Village of Streamwood agrees to pay Contractor for the performance of the work completed in a good and workmanlike manner (an amount not to exceed _____ and 00/100 Dollars ($____), **OR** (for the total quantities of work performed at the unit prices stipulated in said proposal, estimated to be _____ and 00/100 Dollars ($____). Payment shall be in conformance with the

provisions of the Local Government Prompt Payment Act (50 ILCS 505/1 et. seq.).

7. At the time of execution of the Agreement, the Contractor shall furnish, at Contractor's expense, bonds payable to the Owner in the form of bonds set forth herein, secured by a surety company acceptable to the Owner, as follows:

A. Faithful performance bond in an amount equal to one hundred percent (100%) of the total contract price, conditioned upon the faithful performance of all covenants and stipulations under the Contract and holding good for a period of one (1) year after the date when final payment becomes due, except as otherwise provided by law or regulation or by the Contract Documents to protect the Owner against the results of defective materials, workmanship, and equipment during that time.

B. Labor and material bond in an amount equal to one hundred percent (100%) of the total Contract Price for the payment of all persons, companies, or corporations who perform labor upon or furnish material to be used in the Work under this Contract.

8. Contractor agrees that not less than the prevailing wage as determined by the Illinois Department of

Labor, shall be paid to all laborers, workers and mechanics performing work under this Contract in accordance with the Illinois Prevailing Wage Act and Contractor agrees to comply with all other provisions of the Illinois Prevailing Wage Act (820 ILCS 130/0.01 et. seq.) as amended. If the Department of Labor revises the wage rates, the revised rate as provided by the Illinois Department of Labor shall apply to this Agreement and Contractor will not be allowed additional compensation on account of said revisions. Contractor shall review the wage rates applicable to the work of the contract at regular intervals in order to ensure the timely payment of current wage rates. No additional notice of a change in wage rates is required. Contractor shall be responsible to notify each subcontractor of the wage rates set forth in this contract and any revisions thereto.

Contractor and each subcontractor shall make and keep, for a period of not less than five (5) years, records of all laborers, mechanics, and other workers employed by them on the project; the records shall include each worker's name, address, telephone number when available, social security number, classification or classifications, the hourly wages paid in each period, the number of hours

worked each day, and the starting and ending times of work each day.

Contractor and each subcontractor shall submit, no later than the 15th day of each calendar month, a certified payroll for the immediately preceding month with the Illinois Department of Labor. The Illinois Department of Labor maintains a Certified Transcript of Payroll portal for this purpose. As part of the documentation for each progress payment, Contractor and each subcontractor shall submit to the Village the electronic mail certification received from the Illinois Department of Labor acknowledging the submission of the certified payroll report.

Upon seven (7) business days' notice, Contractor and each subcontractor shall make available for inspection the records to the Director of Labor and his deputies and agents at all reasonable hours at a location within this State. Contractor and each subcontractor shall permit his/her employees to be interviewed on the job, during working hours, by compliance investigators of the Department or the Department of Labor.

9. Contractor agrees that it has and will comply with all laws relating to the employment preference to

veterans in accordance with the Veterans Preference Act (330 ILCS 55/0.01 et. seq.).

10. Contractor agrees that it has and will comply with all laws relating to the employment of Illinois workers in accordance with the Employment of Illinois Workers on Public Works Act (30 ILCS 570/1 et. seq.).

11. Contractor agrees that it, pursuant to 30 ILCS 580/1 et. seq. ("Drug-Free Workplace Act"), will provide a drugfree workplace by:

A. Publishing a statement:

(1) Notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance including cannabis, is prohibited in the workplace.

(2) Specifying the actions that will be taken against employees for violations of such prohibition; and

(3) Notifying the employee that, as a condition of employment on this Agreement, the employee will:

(a) Abide by the terms of the statement; and

(b) Notify the employer of any criminal drug statute conviction for a violation occurring

in the workplace no later than five (5) days after such conviction.

B. Establishing a drug-free awareness program to inform employees about:

(1) The dangers of drug abuse in the workplace;

(2) Contractor's policy of maintaining a drug-free workplace;

(3) Any available drug counseling, rehabilitation, and employee assistance program; and

(4) The penalties that may be imposed upon employees for drug violations.

C. Making it a requirement to give a copy of the statement required by Subsection A to each employee engaged in the performance of the Agreement and to post the statement in a prominent place in the workplace.

D. Notifying the Village of Streamwood within ten (10) days after receiving notice under Subparagraph 11(A) 3 (b) from an employee or otherwise receiving actual notice of such conviction.

E. Imposing a sanction on, or requiring the satisfactory participation in a drug abuse assistance or rehabilitation program by any employee who is convicted, as required by 30 ILCS 580/5.

F. Assisting employees in selecting a course of action in the event drug counseling treatment and rehabilitation is required and indicating that a trained referral team is in place.

G. Making a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

12. The Contractor certifies that if the Contractor is not a party to a collective bargaining agreement in effect, Contractor is in compliance with the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 265/1, *et seq.*) and if Contractor is a party to a collective bargaining agreement, that agreement deals with the subject matter of the Substance Abuse Prevention on Public Works Projects Act or has in place and is enforcing a written program which meets or exceeds the program requirements of the Substance Abuse Prevention on Public Works Projects Act.

13. Contractor agrees that it has and will have in place and will enforce a written sexual harassment policy in compliance with 775 ILCS 5/2-105(A)(4).

14. During the performance of this contract, the Contractor agrees as follows:

A. That he or she will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizenship status, age, physical or mental disability unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service; and, further, that he or she will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any underutilization.

B. That, if he or she hires additional employees in order to perform this contract or any portion of this contract, he or she will determine the availability (in accordance with the Department's Rules and Regulations) of minorities and women in the areas from which he or she may reasonably recruit and he or she will hire for each job classification for which employees are hired in a way that minorities and women are not underutilized.

C. That, in all solicitations or advertisements for employees placed by him or her or on his or her behalf, he or she will state that all applicants will be afforded equal opportunity without discrimination because of race,

color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizenship status, age, physical or mental disability unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service.

D. That he or she will send to each labor organization or representative of workers with which he or she has or is bound by a collective bargaining or other agreement or understanding, a notice advising the labor organization or representative of the contractor's obligations under the Act and the Department's Rules and Regulations. If any labor organization or representative fails or refuses to cooperate with the contractor in his or her efforts to comply with the Act and Rules and Regulations, the contractor will promptly notify the Department and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations under the contract.

E. That he or she will submit reports as required by the Department's Rules and Regulations, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all

respects comply with the Act and the Department's Rules and Regulations.

F. That he or she will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Act and the Department's Rules and Regulations.

G. That he or she will include verbatim or by reference the provisions of this clause in every subcontract that may be awarded under which any portion of the contract obligations are undertaken or assumed, so that the provisions will be binding upon the subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply with the provisions. In addition, the contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

In the event of the contractor's non-compliance with the provisions of this Equal Employment Opportunity Clause, the Act or the Rules and Regulations of the Department, the contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the contract may be cancelled or voided in whole or in part, and other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation.

15. During the performance of its Agreement with the Village of Streamwood, Contractor:

Will not maintain or provide for its employees any segregated facilities at any of its establishments, and not permit its employees to perform their services at any location, under its control, where segregated facilities' means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis or race, creed, color, or national origin because of habit, local custom, or

otherwise. Contractor (except where it has obtained identical certifications from proposed Subcontractors and material suppliers for specific time periods), obtain certifications in compliance with this subparagraph from proposed subcontractors or material suppliers prior to the award of a subcontract or the consummation of material supply agreements, exceeding $10,000.00 which are not exempt from the provisions of the Equal Opportunity clause, and that Contractor will retain such certifications in its files.

16. Contractor agrees to assume all risk of loss and to indemnify and hold harmless the Village of Streamwood, its officers, agents and employees from any and all liabilities, claims, suits, injuries, losses, damages, fines or judgments, including litigation costs and attorneys' fees, arising out of the work performed by Contractor including, to the extent allowed by law, those liabilities, injuries, claims, suits, losses, damages, fines or judgments, including litigation costs and attorneys' fees arising out of, or alleged to arise out of, the intentional, willful, wanton or negligent acts of Contractor, its employees, agents, assigns and/or subcontractors.

17. The Contractor represents and warrants to the Village that neither it nor any of its principals, shareholders, members, partners, or affiliates, as applicable, is a person or entity named as a Specially Designated National and Blocked Person (as defined in Presidential Executive Order 13224) and that it is not acting, directly or indirectly, for or on behalf of a Specially Designated National and Blocked Person. The Contractor further represents and warrants to the Village that the Contractor and its principals, shareholders, members, partners, or affiliates, as applicable, are not, directly or indirectly, engaged in, and are not facilitating, the transactions contemplated by this Agreement on behalf of any person or entity named as a Specially Designated National and Blocked Person. The Contractor hereby agrees to defend, indemnify and hold harmless the Village, the Corporate Authorities, and all Village elected or appointed officials, officers, employees, agents, representatives, engineers, and attorneys, from and against any and all claims, damages, losses, risks, liabilities, and expenses (including reasonable attorneys' fees and costs) arising from and

related to any breach of the foregoing representations and warranties.

18. Insurance requirements shall be as follows:

A. Contractor shall procure and maintain for the duration of the Contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work by the contractor, its agents, representatives, employees or subcontractors.

B. Coverage shall be at least as broad as:

(1) Insurance Services Office Commercial General Liability Occurrence form CG 0001 (Ed. 11/85); and

(2) Insurance Services Office form number CA0001 (Ed. 1/87) covering Automobile Liability, symbol 01 "any auto" and endorsement CA0029 (Ed. 12/88) changes in Business Auto and Truckers coverage forms – Insured Contract; and

(3) Worker's Compensation as required by the Labor Code of the State of Illinois and Employers' Liability Insurance.

C. Contractor shall maintain limits no less than:

(1) Commercial General Liability: $2,000,000 combined single limit per occurrence for bodily injury, personal injury, and property damage.

(2) Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

(3) Worker's Compensation and Employers' Liability: Worker's Compensation limits as required by the Labor Code of the State of Illinois and Employers' Liability limits of $1,000,000 per accident.

D. The policies are to contain, or be endorsed to contain the following provisions:

(1) Commercial General Liability and Automobile Liability Coverages:

(a) The Village, its officials and employees are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor, as well as materials, and equipment procured, owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limits on the scope of

the protection afforded to the Village and its officials.

(b) The Contractor's insurance coverage shall be primary insurance as respects the Village, its officials and employees. Any insurance or self-insurance maintained by the Village, its officials or employees shall be excess of Contractor's insurance and shall not contribute with it.

(c) Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the Village, its officials or employees.

(d) Coverage shall state that the Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

(2) Worker's Compensation and Employers' Liability Coverage:

The insurer shall agree to waive all rights of subrogation against the Village, its officials,

employees or volunteers for losses arising from work performed by the Contractor for the Village.

(3) All Coverages:

Each insurance policy required by this clause shall be endorsed to state that the coverage shall not be suspended, voided, canceled, reduced in coverage or in limits except after thirty (30) day's prior written notice by certified mail, return receipt requested, has been given to the Village.

19. Contractor shall at all times observe and comply with all laws, ordinances, and regulations of the federal, state, local and Village government which may in any manner affect the performance of this Contract.

20. No member of the governing body of the Village of Streamwood or other unit of government and no other officer, employee, or agent of the Village of Streamwood or other unit of government who exercises any functions or responsibilities in connection with the carrying out of this project to which this Contract pertains, shall have personal interest, direct or indirect, in the Contract.

Additionally, the Contractor certifies that no officer or employee of the Village of Streamwood has solicited any

gratuity, discount, entertainment, hospitality, loan, forbearance, or other tangible or intangible item having monetary value including, but not limited to, cash, food and drink, and honoraria for speaking engagements related to or attributable to the government employment or the official position of the employee or officer from the contractor in violation of Title 1-13-1,2,3,4 of the Village Code of the Village of Streamwood, adopted by the Village pursuant to the requirements of Article 10 of the State Officials and Employees Ethics Act.

Finally, The Contractor certifies that the Contractor has not given to any officer or employee of the Village of Streamwood any gratuity, discount entertainment, hospitality, loan, forbearance, or other tangible or intangible item having monetary value including, but not limited to, cash, food and drink, and honoraria for speaking engagements related to or attributable to the government employment or the official position of the employee or officer from the contractor in violation of Title 1-13-1,2,3,4 of the Village Code of the Village of Streamwood adopted by the Village pursuant to the requirements of Article 10 of the State Officials and Employees Ethics Act.

21. In the event that Contractor shall fail to perform such work within a reasonable time after being assigned such work or shall fail to complete such work in a good and workmanlike manner, the Village of Streamwood may terminate this Contract by written notice to Contractor, effective immediately upon mailing.

22. All change orders increasing the cost of the contract by Four Thousand Nine Hundred Ninety-Nine Dollars ($4,999.99) or less must be approved, in writing, by the Director of Public Works or his designee. All change orders increasing the cost of the contract by Five Thousand to Twenty Thousand Dollars ($5,000.00 - $20,000.00) must be approved, in writing, by the Village Manager. A change order in excess of Twenty Thousand Dollars ($20,000.00) must be approved by official action of the Village Board of the Village of Streamwood.

Additionally, no change order which authorizes or necessitates any increase in the contract price that is fifty percent (50%) or more of the original contract price or that authorizes or necessitates any increase in the price of a subcontract under the contract that is fifty percent (50%) or more of the original subcontract price shall be issued, unless the portion of the contract that is

covered by the change order is resubmitted for bidding in the same manner for which the original contract was bid, or unless competitive bidding is waived for that portion of the contract that is covered by the change order. Bidding for the portion of the contract covered by the change order shall be subject to any requirements to employ females and minorities on the project that existed at the bidding for the original contract, together with any later requirements imposed by law.

23. Notice as provided for herein shall be transmitted to the Village of Streamwood, Village Manager, 301 East Irving Park Road, Streamwood, Illinois 60107 or to _____, _____, _____, Illinois ____ as may be applicable by first class prepaid mail. Any notice to Contractor shall be deemed received when mailed.

24. Contractor agrees to maintain all records and documents for projects of the Public Body in compliance with the Freedom of Information Act, 5 ILCS 140/1 et seq. In addition, Contractor shall produce within three (3) days, without cost to the Public Body, records which are responsive to a request received by the Public Body under the Freedom of Information Act so that the Public Body may provide records to those requesting them within the

required five (5) day period. If additional time is necessary to compile records in response to a request, then Contractor shall so notify the Public Body within three (3) days in order for the Village shall request an extension so as to comply with the Act. In the event that the Village is found to have not complied with the Freedom of Information Act based upon Contractor's failure to produce documents or otherwise appropriately respond to a request under the Act, then Contractor shall indemnify and hold the Village harmless, and pay all amounts determined to be due including but not limited to fines, costs, attorneys' fees and penalties.

25. Time is of the essence of this Contract.

This Contract is made and executed in duplicate in Streamwood, Cook County, Illinois the day and year first above written.

Contractor:

By:_____

Village of Streamwood

By: _____
Village President

ATTEST:

_____
Village Clerk

SECTION 007200
GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS ATTACHED FOLLOWING THIS PAGE.

END OF SECTION 007200

VILLAGE OF STREAMWOOD
GENERAL INSTRUCTIONS TO BIDDERS

1. **Specifications:** Specifications are included within the bid package. Bidders must indicate any differences from the specifications in their bid proposal. It is the responsibility of the bidder to fully understand the specifications set forth. Include any descriptive literature and indicate any options that differ from the original specifications which should be considered.

2. **Proposal:** All prices and notations must be in ink or typewritten. Mistakes may be crossed out with corrections typed adjacent and all corrections must be initialed in ink by the person signing the proposal. The proposal must be signed by an authorized officer or individual.

3. **Reservations:** The Village President and Board of Trustees reserve the right to reject any or all bids or parts of bids when, in the Village's reasoned judgement, the public interest will be served thereby.

   The Village Board of Trustees may waive formalities or technicalities in bids as the interest of the Village may require.

   a) The Village reserves the right to increase or decrease the quantities to be purchased at the unit prices bid. The quantity intended to be purchased and the period and percentage amount of any such reservation will be stated in the specifications or proposal.
   b) The Village reserves the right to award contracts or place orders on a lump sum or individual group basis, or such combination as shall, in the Village's judgement, be in the best interest of the Village.
   c) The Village may waive minor differences in specifications provided these differences do not violate the specification intent nor materially affect the operation for which the item or items are being purchased.

   On any item indicated to be used for credit as a "trade-in" in the specifications, the Village reserves the option not to use the item as a "trade-in."

4. **Bid Deposit:** When deemed necessary by the Village of Streamwood, bid deposits shall be in the amount as provided in the bid specifications. The deposit shall be a certified check, cashier's check, made payable to the order of the Village of Streamwood; or a bid bond issued by an insurance company licensed to do business in Illinois. A combination of certified check and bid bonds is not an acceptable response to bid deposit requirement.

   The purpose of the deposit guarantees that the successful bidder will supply material and/or services as specified. The bond shall further guarantee the bidder's compliance with the Prevailing Wage Act (820 ISCS 130/1 et seq. (1993), formerly Illinois Revised Statutes, Chapter 48, Section 39s-1 et seq.) on any public works project as defined by the Act.

   All bids not accompanied by such checks or bonds, where required, will not be considered a valid bid.

   Bid deposits (certified checks) will be returned to unsuccessful bidders upon the award of the contract(s), and to successful bidder(s) upon execution of the contract(s) and the meeting of bond requirements, if applicable.

   The successful bidder's failure to execute the contract or meet bond requirements within 10 working days after the award shall result in the deposit being forfeited to the Village as liquidated damages.

5. **Performance Bond:** Is required, the successful bidder shall furnish a performance bond, in a form acceptable to the Finance Director, within ten (10) days after notification of the bid award in an amount not to exceed one hundred percent (100%) of the total bid price. The bond must be with a bonding company acceptable to the Village of Streamwood. Failure to furnish a satisfactory performance and payment bond within the period specified shall be cause for rejection of the bid.

6. **Withdrawal of Proposal:** Bidder may withdraw or cancel a proposal at any time prior to the bid opening time. After the bid opening time, a bidder cannot withdraw or cancel the bid for a period of thirty (30) calendar days after the bid opening date.

7. **Conditions:** Bidders must be familiar with all conditions, instructions and specifications governing this bid. It is the bidder's responsibility to visit a site if necessary and any bid is considered to be based upon the knowledge of all information readily available at the site. Once the bid proposals have been opened, the failure to have read and understood all the conditions, specifications and instructions shall not be cause to alter the original proposal or for the vendor to request additional compensation.

8. **Interpretation:** Any bidder who finds in the bidder's opinion a discrepancy in or omission from the specifications, or is in doubt as to their meaning, or believes that the specifications are discriminatory, shall notify the Finance Director in writing not later than 5 days prior to the scheduled opening of bids. Exceptions taken do not obligate the Village to change the specifications. The Finance Director will notify all bidders in writing, by addendum duly issued, of any interpretations made of specifications or instructions. The Village will assume no responsibility for oral instruction or suggestion. All official correspondence in regard to the specifications should be directed to and will be issued by the Finance Director. Bidders will acknowledge receipt of any addendum issued by returning the addendum(s) with the proposal and so noting on the bid sheet. Oral explanations are not binding.

9. **M.S.D.S.:** Contractor is to supply (M.S.D.S.) Materials Safety Data sheets in accordance with Federal Requirements, if applicable.

10. **Subletting:** A successful bidder shall not assign the contract, or subcontract the whole or any part of the contract without written consent of the Village, except as may be noted on the bid proposal. Such consent shall not relieve the bidder from obligation nor change the terms of the contract.

11. **Material Inspection:** Authorized agents of the Village shall have the right to inspect any material to be used in carrying out the proposal. The Village does not assume any responsibility for the availability of any other materials and equipment required. The contractor shall be responsible for the contracted quality and standards of all materials, components or completed work furnished under this proposal until final acceptance by the Village. Materials, components or completed work not complying therewith may be rejected by the Village and shall be replaced by the contractor at no expense to the Village. Any material or component rejected shall be removed from the premises of the Village at the entire expense of the contractor, after written notice by the Village to contractor that such materials or components have been rejected.

12. **Catalogues or Literature:** Each bidder shall submit all necessary catalogues, descriptive literature, and other documentation

needed to fully describe the material or work proposed to be furnished.

13. **Protest of Award:** Any person who has an objection to the awarding of a solicitation by the Village, pursuant to competitive bidding procedures, shall lodge that protest, in writing, with the Finance Director prior to award by the Village President and Board of Trustees. A protest lodged after award by the Village Board will not be considered.

14. **Acceptance:** After the acceptance and award of the bid, and upon receipt of a written purchase order executed by the proper officials of the Village, this instruction to bidders, including the specifications, will constitute part of the legal contract between the Village of Streamwood and the successful bidder.

15. **Materials and Equipment:** Except where the specifications indicate otherwise, the Village of Streamwood is not responsible to provide any tools, equipment or storage to the contractor in order to permit him/her to complete any contractual obligation under any contract which may be awarded as the result of the bid.

16. **Exceptions:** Any bidder's exceptions to the terms or conditions, or deviations from the written specifications, must be in writing and attached to the bid form. No verbal exceptions or alleged agreements with employees of the Village will be considered legal or binding. Any bidder's exceptions or deviations may be cause for rejection of the bid proposal. The submission of a bid shall be considered an agreement to all the terms, conditions and specifications provided herein and in the various bid documents, unless specifically noted otherwise in the proposal.

17. **Required Insurance:** Contractor shall maintain for the duration of this contract and any extensions thereof insurance issued by a company or companies qualified to do business in the State of Illinois. The insurance companies providing coverage shall be rated in the Best's Key Rating Guide. The Village will accept companies with a rating of A- or better and shall have a financial size category of VII or better. See contract for minimum requirements.

    WORKERS COMPENSATION AND EMPLOYER'S LIABILIY:

Workers Compensation	Minimum
Employer's Liability	
a) Each Accident:	$1,000,000
b) Disease – policy limit	$1,000,000
c) Disease – each employee	$1,000,000

    COMPREHENSIVE GENERAL LIABILTY:

General Aggregate Limit	$2,000,000
Products-Completed Operations	$2,000,000
Each Occurrence Limit	$1,000,000

    The Village of Streamwood is named an additional insured on General Liability policy. The Village may accept a separate owner's protective liability policy provided all coverage, limits and endorsements are in conformity with this section. The Village of Streamwood is a Named Insured on OCP policy.

18. **Indemnity:** If a contract is awarded, the successful bidder will be required to indemnify and hold the Village harmless from and against all liability and expenses, including attorney's fees, howsoever arising or incurred, alleging damage to property or injury to, or death of, any person, arising out of or attributable to the bidder's performance of the contract awarded.

    Any property or work to be provided by the bidder under this contract will remain at the bidder's risk until written acceptance by the Village; and the bidder will replace, at bidder's expense, all property or work damaged or destroyed by any cause whatsoever.

19. **Collusion:** In submitting a proposal, the bidder certifies to the Village of Streamwood that the prices contained in the proposal have been established without knowledge of any other proposal on this item and the bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any other bidder, Village employee or any other person, to fix the bid price submitted by the bidder or any other bidder, and agrees to indemnify the Village for any losses sustained by it due to illegal actions of the bidder. (State of Illinois Criminal Code of 1961, Section 33E-3 or 33E0-4 as amended.)

20. **Termination for Convenience:** The Village of Streamwood may terminate a contract, in whole or in part, whenever the Village determines that such termination is in the best interest of the Village, without showing cause, upon giving written notice to the contractor. The Village shall pay all reasonable costs incurred by the contractor up to the date of termination. However, in no event shall the contractor be paid an amount which exceeds the price bid for the work performed. The contractor shall not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

21. **Other Requirements:** The bidder certifies that any equipment to be furnished shall be new, current model, standard production, and fully operable unless otherwise indicated on the bid form. Operating and maintenance manuals will be furnished at no cost.

22. **Public Advertising:** The successful bidder is specifically denied the right of use in any form or medium the name of the Village of Streamwood for public advertising unless the Village of Streamwood grants express permission.

23. **Fair Employment Practices:** The bidder, in the submission of a proposal, assures the Village that he/she is an "Equal Opportunity Employer" as defined by Section 2000(E) of Chapter 21, Title 42 of the United States Code Annotated and Federal Executive Orders #11246 and #11375 which are incorporated herein by reference , and as such, will not discriminate against any person by reason of race, creed, color, religion, age, sex, or physical and mental handicaps with respect to the hiring, application for employment, tenure, terms or condition of employments of any person.

24. **Illinois Employment Opportunity Clause:** The Illinois Employment Practice Commission Equal Opportunity clause as required by Article II of Illinois FEPC Rules and Regulations, is considered to be a part of any contract or purchase agreement. A copy is included in this Instructions to Bidders.

25. **Illinois Drug Free Workplace Act:** In submission of any proposal, the contractor acknowledges and warrants that the contractor's workplace notifies employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the contractor's workplace (30ILCS 580/1 et seq.).

26. **Employment of Illinois Labor and Prevailing Wage:** In submission of any proposal, the bidder is agreeing to comply with provisions of Preference To Citizens (Illinois) on Public Works Projects Act (Illinois Revised Statutes, Chapter 48, Section 269 through 275, and the Wages of Employees on Public Works

(Prevailing Wage Act, 820 ILCS 130/1 et seq. (1993), formerly Illinois Revised Statutes, Chapter 48, Section 39s-1 et seq.)

The provisions of the applicable state laws are part of any contract awarded by the Village of Streamwood and bidders must be aware of and willing to comply with these two provisions prior to the submission of any bids. The requirements of these two provisions mandate that preference to Illinois laborers must be granted on any work done on the construction or building of any public works project and that the prevailing rate of wages in the locality for each craft or type of worker or mechanic needed on the project, will be paid. The prevailing rates may be obtained by writing the Conciliation and Mediation Division, Illinois Department of Labor, 100 N. First Street, Springfield, IL 62706 or from their website at www.illinois.gov/idol . (Attached when applicable.)

27. **The Americans with Disabilities Act:** In submission of any proposal, the bidder acknowledges and warrants that the work or service shall be designed in full compliance with the Americans with Disabilities Act (42 U.S.C. 12101 et seq.) and with applicable regulations and accessibility guidelines there under. In addition, the bidder acknowledges the Environmental Barriers Act (IL Rev Stat Ch 111 1/2, par. 3711 et seq.) and its regulations in the Illinois Accessibility Code (71 IL Admin. Code S400.110 et seq.). That all products, services and programs conform to, and be delivered in a manner consistent with the Americans with Disabilities Act. As a condition of receiving a contract with the Village of Streamwood, the vendor certifies that services, programs, and activities provided under said contract are and will continue to be in compliance with the ADA. Further, the vendor agrees to indemnify the Village of Streamwood against any and all claims and the costs of legal defense resulting from the vendor's failure to be in compliance with the ADA.

28. **Equal Employment Clause:** In the event of the contractor's noncompliance with any provision of this Equal Employment Opportunity Clause, the Illinois Fair Employment Practices Act or the Fair Employment Practices Commission's Rules and Regulations for Public Contracts, the contractor may be declared non-responsible and therefore ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the contract may be canceled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulations.

During the performance of this contract, the contractor agrees as follows:

a) That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or ancestry; and further that it will examine all job classifications to determine if minority persons or women are under utilized and will take appropriate affirmative action to rectify any such under utilization.
b) That, if it hires additional employees in order to perform this contract or any portion hereof, it will determine the availability (in accordance with the Commission's Rules and Regulations for Public Contracts) of minorities and women in the area(s) from which it may reasonably recruit and it will hire for each job classification for which employees are hired in such a way that minorities and women are not under utilized.
c) That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, national origin or ancestry.
d) That it will send to each labor organization or representative of workers with which it has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the contractor's obligation under the Illinois Fair Employment Practices Act and the Commission's Rules and Regulations for Public Contracts. If any such labor organization or representative fails or refuses to cooperate with the contractor in its efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Illinois Fair Employment Practices Commission and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations thereunder.
e) That it will submit reports as required by the Illinois Fair Employment Practices Commission's Rules and Regulations for Public Contracts, furnish all relevant information as may from time to time be requested by the Commission or the contracting agency, and in all respects comply with the Illinois Fair Employment Practices Act and the Commission's Rules and Regulations for Public Contracts.
f) That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Illinois Fair Employment Practices Commission for purposes of investigation to ascertain compliance with the Illinois Fair Employment Practices Act and the Commission's Rules and Regulations for Public Contracts.
g) That it will include verbatim or by reference the provisions of paragraphs a through g of this clause in every performance subcontract as defined in Section 2.10(b) of the Commission Rules and Regulations for Public Contracts so that such provision will be binding upon every such subcontractor; and that it will also so include the provision of paragraphs a, e, f, and in every supply subcontract as defined in Section 2.10(a) of the Commission's Rules and Regulations for Public Contracts so that such provisions will be binding upon every such subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by all its subcontractors; and further it will promptly notify the contracting agency and the Illinois Fair Employment Practices Commission in the event any subcontractor fails or refuses to comply therewith. In addition, no contractor will utilize any subcontractor declared by the commission to be non-responsible and therefore ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

SECTION 007300
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 007200 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.

B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.02 MODIFICATIONS TO GENERAL CONDITIONS

A. Order of Precedence: In the event of a conflict, discrepancy, or inconsistency among the Contract Documents, and unless otherwise specifically indicated, the following order of precedence shall govern:
   1. Modifications to the Contract issued after execution of the Agreement, including Change Orders and Construction Change Directives.
   2. Agreement between Owner and Contractor.
   3. Addenda.
   4. Supplementary Conditions.
   5. General Conditions.
   6. Specifications.
   7. Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 007300

SECTION 012000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Price and Contract Time.

C. Change procedures.

D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 005000 - Contracting Forms and Supplements: Forms to be used.

B. Section 007200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

C. Section 012100 - Allowances: Payment procedures relating to allowances.

D. Section 012200 - Unit Prices: Payment and modification procedures relating to unit prices.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: CONFLU K701 FORM.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Landscape Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form CONFLU K700 FORM .

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Landscape Architect for approval.

D. Forms filled out by hand will not be accepted.

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

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

I. Submit one electronic copyto Architect of each Application for Payment.

J. When Landscape Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Landscape Architect will issue instructions directly to Contractor.
   1. Supplemental Instructions (SI):
      a. A Supplemental Instruction may provide clarification, supplemental drawings, revised details, material selections, dimensional information, or other minor revisions consistent with the intent of the Contract Documents.
      b. A Supplemental Instruction does not authorize an adjustment to the Contract Sum or Contract Time.
      c. If the Contractor believes that a Supplemental Instruction affects the Contract Sum or Contract Time, notify the Landscape Architect in writing within 5 calendar days after receipt and before performing the affected Work, except when otherwise directed. Include the basis and estimated effect of the claimed adjustment.
         1) Unless the Landscape Architect issues a Proposal Request or other written modification procedure, proceed with the Supplemental Instruction as part of the Contract Work.

B. For other required changes, Landscape Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. For changes for which advance pricing is desired, Landscape Architect will issue a Proposal Request (PR) document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 calendar days.

D. Contractor may propose a change by submitting a request for change to Landscape Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Landscape Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Landscape Architect.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.

F. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.

G. Execution of Change Orders: Landscape Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Price, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 017000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012000

SECTION 012100
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contingency allowance.

B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

A. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 ALLOWANCES SCHEDULE

A. Section 32 93 00: Include the stipulated sum of $10,000 for labor of existing tree to remain pruning.

1. Pruning of newly planted trees, including removal of dead, damaged, broken, or split branches, is included in the Base Bid and shall not be charged against this allowance.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012100

SECTION 012200
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 RELATED REQUIREMENTS

A. Document 002113 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.

B. Document 004322 - Unit Prices Form: List of Unit Prices as supplement to Bid Form

C. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT OF QUANTITIES

A. Take all measurements and compute quantities. Measurements and quantities will be verified by Owner.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

C. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.

D. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

E. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

F. Measurement by Area: Measured by square dimension using mean length and width or radius.

G. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

H. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

I. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Landscape Architect prior to starting work.

1.06 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Landscape Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.07 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Landscape Architect, it is not practical to remove and replace the Work, Landscape Architect will direct one of the following remedies:
   1. The defective Work will be partially repaired to the instructions of the Landscape Architect, and the unit price will be adjusted to a new unit price at the discretion of Landscape Architect.

C. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
   1. The defective Work will be partially repaired to the instructions of the Owner, and the unit price will be adjusted to a new unit price at the discretion of Owner.

D. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

E. The authority of Owner to assess the defect and identify payment adjustment is final.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012200

SECTION 012300
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

B. Procedures for pricing Alternates.

1.02 RELATED REQUIREMENTS

A. Document 002113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

B. Document 004323 - Alternates Form: List of Alternates as supplement to Bid Form.

1.03 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. The Owner may accept any one or combination of Alternates.

C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

D. Deduct Alternate amounts shall include full credit for labor, materials, equipment, transportation, disposal, supervision, coordination, overhead, profit, insurance, bonds, taxes, fees, and incidentals associated with the deleted Work

E. The amount of each Deduct Alternate shall equal the total scheduled value of the corresponding item or items in Document 00 43 73, Bid Breakdown and Proposed Schedule of Values Form.

F. Unless otherwise indicated, acceptance of a Alternate does not relieve the Contractor of responsibility for protecting completed Owner-performed Work and coordinating interfaces with the remaining Contract Work.

1.04 SCHEDULE OF ALTERNATES

A. **Alternate No. 1 - Clearing and Grubbing**
   1. Base Bid Item: Include complete clearing and grubbing within the Contract Limits indicated in the Contract Documents, excluding tree removal and other demolition specifically identified under separate Deduct Alternates.
   2. Deduct Alternate: Deduct the complete cost of clearing and grubbing. The Owner will perform this Work before the Contractor proceeds with affected construction.

B. **Alternate No. 2 - Tree Removal**
   1. Base Bid Item: Include removal of trees indicated for removal, including cutting, stump removal, root removal, loading, hauling, legal disposal, backfilling resulting holes, and restoration required for subsequent Work.
   2. Deduct Alternate: Deduct the complete cost of tree removal. The Owner will perform this Work.

C. **Alternate No. 3 - Site Demolition**
   1. Base Bid Item: Include removal and legal disposal of the existing playground, shed or building, signage and foundations, and paving indicated for removal, including backfilling and rough grading resulting excavations.
   2. Deduct Alternate: Deduct the complete cost of the identified site demolition. The Owner will perform this Work.

D. **Alternate No. 4 - Normal Soil Spoil Hauling and Disposal**
   1. Base Bid Item: Include loading, hauling, placement, and legal disposal of normal soil spoil generated by the Work.

2. Deduct Alternate: Deduct the cost of Contractor-provided trucks, hauling, placement, disposal fees, and related transportation for normal soil spoil. The Owner will provide trucks and a Village-designated receiving site.
    a. Contractor shall remain responsible for excavation, temporary stockpiling, handling, and loading of normal soil spoil into Owner-provided trucks unless otherwise indicated.

E. **Alternate No. 5 - Saturated Soil Spoil Hauling and Disposal**
1. Base Bid Item: Include loading, hauling, handling, stabilization when required, and legal disposal of saturated soil spoil generated by the Work.
2. Deduct Alternate: Deduct the cost of Contractor-provided trucks, hauling, disposal fees, and related transportation for saturated soil spoil. The Owner will provide trucks and an approved receiving or disposal location.
    a. Contractor shall remain responsible for excavation, temporary stockpiling, containment, handling, and loading of saturated soil spoil into Owner-provided trucks unless otherwise indicated.

F. **Alternate No. 6 - Underground Modular Stormwater System**
1. Base Bid Item: Include furnishing and installation of the complete underground modular stormwater detention systems indicated in the Contract Documents, including delegated design, modular units, excavation, subgrade preparation, base and bedding, geotextiles, aggregate, backfill, compaction, system assembly, connections, appurtenances, testing, and restoration.
2. Deduct Alternate: Deduct the complete cost of the underground modular stormwater detention systems. The Owner will furnish and install the systems under a separate contract.
    a. Contractor shall coordinate the remaining storm sewer Work and make connections to the Owner-installed systems at the locations and elevations indicated in the Contract Documents.

G. **Alternate No. 7 - Parking Lot Excavation and Aggregate Base**
1. Base Bid Item: Include parking lot excavation, removal or reuse of excavated materials, subgrade preparation, proof rolling, grading, compaction, aggregate base, and related Work required to prepare the parking lot for installation of the specified pavement system.
2. Deduct Alternate: Deduct the complete cost of parking lot excavation, subgrade preparation, and aggregate base. The Owner will perform this Work.
    a. Contractor shall retain responsibility for installation of the remaining parking lot pavement system, markings, signs, drainage components, and other Work not specifically deleted.
    b. Contractor shall verify that the Owner-prepared surface is ready to receive the Contractor’s Work and promptly notify the Owner of visible deficiencies before proceeding.

H. **Alternate No. 8 - Parking Lot Curb and Gutter**
1. Base Bid Item: Include furnishing and installation of the complete parking lot curb and gutter indicated in the Contract Documents, including excavation, aggregate base, reinforcement, concrete, joints, finishing, curing, backfill, and restoration.
2. Deduct Alternate: Deduct the complete cost of parking lot curb and gutter. The Owner will perform this Work.
    a. Contractor shall coordinate adjoining pavement, grading, drainage, and restoration with the Owner-installed curb and gutter.

I. **Alternate No. 9 - Pond Fountain**
1. Omit pond fountain equipment and associated appurtenances, including fountain unit, controls, lighting, mounting, anchorage, and final connection work. Retain electrical rough-in and capped electrical stub for future fountain installation.

J. **Alternate No. 10 - Helical Light Pole Foundations**

1. Provide Contractor-designed helical foundations for site light poles in lieu of the reinforced concrete foundations indicated on the Drawings. Alternate price shall include omission of the reinforced concrete foundation scope from the Base Bid and all costs associated with the helical foundation system, including delegated structural design, signed and sealed calculations and details by an Illinois-licensed structural engineer, materials, and installation required for a complete system. Design shall be based on the Project geotechnical report and applicable light pole loads.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012300

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.
B. Web-based project software service.
C. Preconstruction meeting.
D. Progress meetings.
E. Construction progress schedule.
F. Progress photographs.
G. Number of copies of submittals.
H. Requests for Interpretation (RFI) procedures.
I. Submittal procedures.
J. Field Observation Reports.

1.02 RELATED REQUIREMENTS

A. Section 007200 - General Conditions: Duties of the Construction Manager.
B. Section 016000 - Product Requirements: General product requirements.
C. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
B. Make the following types of submittals to Landscape Architect:
    1. Requests for Interpretation (RFI).
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Manufacturer's instructions and field reports.
    5. Applications for payment and change order requests.
    6. Progress schedules.
    7. Coordination drawings.
    8. Correction Punch List and Final Correction Punch List for Substantial Completion.
    9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WEB-BASED PROJECT SOFTWARE SERVICE

A. Web-Based Project Software Service: Provide, administer, and use web-based project software to host and manage project communication and documentation.
    1. Include, at minimum, the following features:
        a. Project directory, including Owner, Contractor, subcontractors, Landscape Architect, Landscape Architect's consultants, and other entities involved in the project. Include names of contact persons and contact information for each entity.
        b. Access control for each entity and for each workflow process to determine each entity's digital rights to create, modify, view, and print documents.
        c. Workflow planning, allowing customization of workflow for each project entity.
        d. Creation, logging, tracking, and notification for project communications.
        e. Tracking of project communication statuses in real time, including timestamped response log.

f. Procedures for viewing PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
g. Processing and tracking of payment applications.
h. Processing and tracking of contract modifications.
i. Creation and distribution of meeting minutes.
j. Document management for drawings, specifications, and coordination drawings, including revision control.
k. Management of construction progress photographs.
l. Mobile device compatibility.
m. Creation of data analytics reports.
n. Creation and export of editable logs for software functions. Provide Owner, Landscape Architect, and Landscape Architect's consultants with rights and ability to download logs when requested.

2. Cost: Pay cost of service. Include the cost of the service in the contract price.
3. Provide up to 20 user licenses for use by Owner, Landscape Architect, Landscape Architect's consultants, and other entities involved in the project.
4. Comply with the software service's current published licensing agreements.
5. Training: Provide one-hour, web-based training session for users of software service. Further training is the responsibility of the user.
   a. Representatives of Owner are scheduled and included in this training.
6. Project Closeout: Landscape Architect determines when to terminate the software service for the project and is responsible for obtaining archive copies of files for Owner.
7. Web-Based Project Software Services: The selected service is:
   a. Procore Technologies, Inc.; Procore construction management platform; www.procore.com..
   b. Substitutions: See Section 016000 - Product Requirements.

3.02 PRECONSTRUCTION MEETING

A. Landscape Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Landscape Architect.
   3. Contractor.
   4. Major subcontractors.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   4. Scheduling.
   5. Safety.

D. Record minutes and distribute copies within two days after meeting to participants, with copies to Landscape Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Landscape Architect.
   4. Contractor's superintendent.

5. Major subcontractors.

C. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Maintenance of progress schedule.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Other business relating to work.

D. Record minutes and distribute copies within two days after meeting to participants, with copies to Landscape Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. 5 calendar days prior to the Preconstruction meeting submit a project schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 5 calendar days days.

3.05 PROGRESS PHOTOGRAPHS

A. Submit new photographs at least once a month, within 3 days after being taken.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Landscape Architect.

D. In addition to periodic, recurring views, take photographs of each of the following events:
1. Foundations in progress and upon completion.
2. Structural framing in progress and upon completion.
3. Final completion, minimum of ten (10) photos.

E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
2. Consult with Landscape Architect for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Web-Based Project Software Site.
2. File Naming: Include project identification, date and time of view, and view identification.

3.06 FIELD OBSERVATION REPORTS

A. The Landscape Architect may issue Field Observation Reports following visits to the Project site. Reports may document observed construction progress, apparent deviations from the Contract Documents, coordination concerns, incomplete Work, damaged Work, and other matters requiring Contractor attention.

B. Field Observation Reports are based on limited observations made during periodic site visits and are not intended to represent an exhaustive inspection of the Work. Issuance or omission of a Field Observation Report does not relieve the Contractor of responsibility for complying with the Contract Documents.

C. Field Observation Reports do not authorize changes to the Work, Contract Sum, or Contract Time. Changes requiring an adjustment to the Contract Sum or Contract Time shall be processed in accordance with Section 01 20 00.

D. Contractor shall review each Field Observation Report, distribute it to affected subcontractors and suppliers, and promptly correct observed Work that does not comply with the Contract Documents.

E. Maintain a current status of Field Observation Report items in the Web-Based Project Software Service. Identify each item as open, in progress, ready for review, or complete.

F. Photographs or other documentation may be required to demonstrate completion of identified corrective Work. The Landscape Architect may verify completion during a subsequent site visit.

3.07 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare using software provided by the Web-Based Project Software.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 016000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Landscape Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Discrete and consecutive RFI number, and descriptive subject/title.
   3. Issue date, and requested reply date.
   4. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   5. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

H. Review Time: Landscape Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Landscape Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.08 SUBMITTAL SCHEDULE

A. Submit to Landscape Architect for review a schedule for submittals in tabular format.
   1. Coordinate with Contractor's construction schedule and schedule of values.
   2. Format schedule to allow tracking of status of submittals throughout duration of construction.
   3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

3.09 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Design data.
   3. Shop drawings.
   4. Samples for selection.
   5. Samples for verification.

B. Submit to Landscape Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.10 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Certificates.
   2. Test reports.
   3. Inspection reports.
   4. Manufacturer's instructions.
   5. Manufacturer's field reports.
   6. Other types indicated.

B. Submit for Landscape Architect's knowledge as contract administrator or for Owner.

3.11 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017000 - Execution and Closeout Requirements.
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.12 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Landscape Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.13 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a single transmittal for related items.
   2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   3. Transmit using approved form.
      a. Use form generated by Web-Based Project Software Service.
   4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.

a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.

5. Schedule submittals to expedite the Project, and coordinate submission of related items.
   a. For each submittal for review, allow 10 calendar days excluding delivery time to and from the Contractor.
   b. For sequential reviews involving Landscape Architect's consultants, Owner, or another affected party, allow an additional 5 calendar days.
6. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.14 SUBMITTAL REVIEW

A. Submittals for Review: Landscape Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Landscape Architect will acknowledge receipt and review. See below for actions to be taken.

C. Landscape Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Landscape Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
   a. "No Exception Taken", or language with same legal meaning.
   b. "Make Corrections as Notes - No Resubmission Required", or language with same legal meaning.
      1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
   c. "Make Corrections as Notes - Resubmission Required", or language with same legal meaning.
      1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
      2) Non-responsive resubmittals are automatically rejected, with or without stamp, after fifteen (15 days).
2. Not Authorizing fabrication, delivery, and installation:
   a. "Revise and Resubmit".
      1) Resubmit revised item, with review notations acknowledged and incorporated.
      2) Non-responsive resubmittals are automatically rejected, with or without stamp, after fifteen (15 days).
   b. "Rejected".
      1) Submit item complying with requirements of Contract Documents.

E. Landscape Architect's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

END OF SECTION 013000

SECTION 014000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Testing and inspection agencies and services.

E. Control of installation.

F. Mock-ups.

G. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures.

B. Section 014216 - Definitions.

C. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Landscape Architect, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

D. Erection Drawings: Submit drawings for Landscape Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.04 QUALITY ASSURANCE

A. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in Illinois.

1.05 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Landscape Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Landscape Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing. Work not meeting requirements of the specifications shall be retested at the expense of the Contractor.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Landscape Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Landscape Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Notify Landscape Architect and Owner Consultant three working days in advance of dates and times when mock-ups will be constructed.

E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

F. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

G. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

3.03 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Landscape Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Landscape Architect and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Landscape Architect.
   6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Landscape Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Landscape Architect.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.04 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner will direct an appropriate remedy or adjust payment.

END OF SECTION 014000

SECTION 014216
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, connect, finish, cure, protect, clean, adjust, test, start up, and make ready for use.

C. Product: Materials, machinery, components, equipment, fixtures, and systems incorporated into the Work. The term does not include materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the Work. Products shall be new unless otherwise indicated or specifically permitted by the Contract Documents.

D. Project Manual: The book-sized volume that includes the Procurement Requirements, Contracting Requirements, and Specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

G. Acceptable: Acceptable to the Landscape Architect.

H. Approved: Approved in writing by the Landscape Architect. Approval does not relieve the Contractor of responsibility for compliance with the Contract Documents.

I. Directed: Directed in writing by the Owner or Landscape Architect, acting within their respective authority under the Contract Documents.

J. Indicated: Shown, scheduled, specified, or otherwise required by the Contract Documents.

K. Installer: The Contractor or an entity engaged by the Contractor to perform a particular portion of the Work, including installation, erection, application, or construction.

L. Similar: Comparable in materials, design, function, performance, quality, and appearance, unless otherwise indicated.

M. Base Bid: The Bid amount for the complete Work before adjustment for accepted Alternates.

N. Deduct Alternate: An amount proposed to be deducted from the Base Bid if the Owner accepts the Alternate and deletes the identified Work from the Contractor’s scope.

O. Owner-Performed Work: Work deleted from the Contractor’s scope by an accepted Deduct Alternate or Change Order and performed by the Owner, the Owner’s forces, or a separate contractor.

P. Not in Contract (NIC): Work, products, or services that are not included in the Contractor’s scope of Work.

Q. Owner-Furnished, Contractor-Installed (OFCI): Products furnished by the Owner for installation by the Contractor. Contractor shall receive, unload, store, protect, coordinate, and install the products unless otherwise indicated.

R. Owner-Furnished, Owner-Installed (OFOI): Products furnished and installed by the Owner or under a separate contract. Contractor shall coordinate the Work with the Owner’s installation unless otherwise indicated.

S. Proposal Request: A written request for pricing or information concerning a potential change in the Work. A Proposal Request is not authorization to proceed with the proposed change.

T. Request for Information (RFI): A written request from the Contractor seeking clarification or interpretation of the Contract Documents. An RFI is not authorization to change the Work, Contract Sum, or Contract Time.

U. Web-Based Project Software Service: An electronic project-management platform approved for transmitting, routing, reviewing, and maintaining Project records and communications.

V. Basis-of-Design Product: A product identified by manufacturer and model to establish the required design, performance, quality, dimensions, appearance, and other characteristics. Comparable products are subject to the substitution requirements of the Contract Documents.

W. Approved Equal: A product accepted in writing as meeting or exceeding the requirements and salient characteristics of the specified product. Acceptance does not relieve the Contractor of responsibility for dimensions, coordination, performance, or compliance with the Contract Documents.

X. Field Verify: Confirm dimensions, elevations, locations, quantities, and existing conditions at the Project site before proceeding with affected Work.

Y. Contract Limits: The boundaries within which the Contractor is authorized and required to perform the Work, except where the Contract Documents specifically require Work outside those boundaries.

Z. Remove: Detach, dismantle, demolish, or excavate an item and legally dispose of it off-site, unless indicated to be salvaged, reused, relocated, or delivered to the Owner.

AA. Salvage: Carefully remove, clean, protect, label, store, and deliver an item to the Owner or reinstall it as indicated, without damage that would prevent its intended reuse.

BB. Existing to Remain: Existing construction, utilities, vegetation, or site features that are not indicated for removal and that shall be protected from damage throughout construction.

CC. Remove and Reinstall: Carefully remove, store, protect, clean, and reinstall an existing item in its original or indicated location.

DD. Separate Contractor: A contractor retained directly by the Owner to perform work that is separate from the Contractor’s Work.

EE. Owner’s Forces: Personnel, equipment, and resources employed or controlled directly by the Owner to perform Owner-performed work.

FF. Coordinate: Schedule, sequence, communicate, and arrange the Work to avoid conflicts and provide complete, properly integrated construction.

GG. Match Existing: Provide new Work that matches the existing adjacent Work in material, color, texture, dimensions, profile, finish, and appearance, unless otherwise indicated.

HH. As Required: As necessary to provide a complete, functional, code-compliant, and properly coordinated installation, whether or not every incidental component is specifically indicated.

II. Underground Modular Stormwater Detention System: A proprietary subsurface stormwater storage system consisting of modular storage units, structural components, geotextiles or geomembranes, aggregate base and surround, inspection and maintenance access, pipe connections, fittings, and related appurtenances required to provide the storage volume and performance indicated in the Contract Documents.

JJ. Basis-of-Design Underground Detention System: The underground modular stormwater detention system identified in the Contract Documents as the basis for the Base Bid. Proposed alternate systems shall meet the required storage volume, elevations, loading, access, maintenance, hydraulic performance, and other requirements of the Contract Documents.

KK. Normal Soil Spoil: Excavated soil that can be loaded, transported, placed, spread, and handled using conventional earthwork equipment without special containment, stabilization, solidification, dewatering, or extraordinary handling procedures.

LL. Saturated Soil Spoil: Excavated soil containing sufficient free water or excessive moisture that it cannot be conventionally loaded, transported, placed, or handled without special containment, stabilization, solidification, dewatering, or other extraordinary procedures.

MM. Pond Excavation Spoil: Soil, sediment, dredged material, or other material excavated from the existing pond, pond expansion area, or regulated aquatic resource.

NN. Village-Designated Receiving Site: A location identified by the Owner for delivery and placement of approved excavated material. Acceptance of material at a Village-designated receiving site does not relieve the Contractor of responsibility for loading, coordination, protection, or compliance with the Contract Documents unless specifically identified as Owner-performed Work.

OO. Owner-Provided Hauling: Hauling performed using trucks and operators furnished by the Owner. Contractor responsibilities for excavation, stockpiling, loading, site access, coordination, and protection remain as indicated in the applicable Deduct Alternate.

PP. Owner-Performed Alternate Work: Work included in the Base Bid that is deleted from the Contractor’s scope when the corresponding Deduct Alternate is accepted and is subsequently performed by the Owner, the Owner’s forces, or a Separate Contractor.

QQ. Classification of Soil Spoil: Classification of excavated material as Normal Soil Spoil or Saturated Soil Spoil shall be based on its condition at the time of excavation and confirmed by the Civil Engineer or Owner’s authorized representative before hauling or disposal.

RR. Pond Dewatering: Temporary removal, control, conveyance, treatment, and discharge of surface water and groundwater required to perform pond excavation and related Work.

SS. Clean Fill: Uncontaminated material suitable for the intended placement and meeting applicable regulatory and Contract Document requirements.

TT. Aquatic Resource: The existing pond, Wetland 1/Waters 1, and other regulated waters identified in the Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014216

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dewatering

B. Temporary sanitary facilities.

C. Temporary Controls: Barriers, enclosures, and fencing.

D. Vehicular access and parking.

E. Waste removal facilities and services.

1.02 RELATED REQUIREMENTS

A. Section 015813 - Temporary Project Signage.

1.03 DEWATERING

A. Provide temporary means and methods for dewatering all temporary facilities and controls.

B. Maintain temporary facilities in operable condition.

1.04 TEMPORARY SANITARY FACILITIES

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

B. Maintain daily in clean and sanitary condition.

1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide protection for plants designated to remain. Replace damaged plants.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.07 EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons.

1.08 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Existing parking areas located at _____ may be used for construction parking.

1.09 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 PROJECT SIGNS - SEE SECTION 015813

1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 015000

SECTION 015639
TREE RETENTION AND PROTECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Contract Conditions, Drawings, and Division - 1 Specification sections apply to Work of this section.

1.02 SUMMARY

A. The work of this section consists of retention and protection of trees during the construction of the project.

1.03 GENERAL REQUIREMENTS

A. If it appears that the completion of the construction may cause damage to the branches of any tree, the Contractor shall contact the City Forester's Office. The Forester will make a determination as to whether such damage is eminent.

B. Motorized equipment and trailers, including tractors, bobcats, bulldozers, trackhoes, trucks, cars, and carts shall not be allowed access within tree protection areas. Should access be necessary within designated tree protection areas, the existing grade shall be covered with six (6) to eight (8) inches of wood mulch to help distribute the weight of equipment and to minimize soil compaction and rutting. Plywood and/or mulch is not acceptable bridging material for driving over exposed tree roots. Exposed tree roots shall not be driven over. The City Forester or Project Consulting Arborist shall be notified and shall approve of the access and driving surface prior to its use.

C. Materials and supplies shall not be stockpiled or stored within the tree protection area. Should temporary storage be necessary within designated tree protection areas, the existing grade shall be covered with double, overlapping sheets of ¾ inch thick plywood, or six (6) to eight (8) inches of wood mulch to help distribute the weight of materials or supplies and to minimize soil compaction.

D. Under no circumstances shall any objects or materials be leaned against or supported by a tree's trunk, branches, or exposed roots. The attachment or installation to trees of any sign, cable, wire, nail, swing, or any other material that is not needed to help support the natural structure of the tree is prohibited. Standard arboricultural techniques such as bracing or cabling that are performed by professional arborists are acceptable upon approval by the City Forester or Project Consulting Arborist.

E. Appropriate tree pruning and/or removal permits must be secured prior to beginning work.

1.04 DEFINITIONS

A. Tree Protection Area: Generally, a tree protection area should consist of the ground encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and dripline, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater. (See section below). Areas of ground covered by pavement, buildings, or other permanent structures where the presence of roots is minimal or negligible, are excluded. The area under or within the tree's dripline is also referred to as the "Critical Root Zone" (see below).

1. With groups of trees or where an array effect is present, there may be discontinuous (non-overlapping) perimeters of tree protection areas, which result in difficult to maintain or ineffective tree protection fencing. In these cases, even though tree protection areas do not overlap, they should be treated as though they do if the distance between the perimeters of such areas is less than thirty (30) feet. In effect, this will artificially enlarge the area of tree protection, but will result in a more clearly defined, manageable area.

B. Dripline: The outermost edge of the tree's canopy or branch spread. The area within a tree's dripline is all the ground under the total branch spread.

C. Critical Root Zone: Generally, all of the ground area included in the dripline.

D. Diameter (Caliper): The size (in inches) of a tree's trunk is measured at:
   1. six (6) inches above grade for trunk diameters up to and including four (4) inches;
   2. twelve (12) inches above grade for trunk diameters from four (4) inches up to and including eight (8) inches; and
   3. four and a half (4½) feet above grade for trunk diameters greater than eight (8) inches; in accordance with guidelines established in the "Guide for Plant Appraisal". All measurements should be rounded to the nearest inch.

E. HIGH-VALUE SHRUB: Any specimen shrub with an appraised value of $100.00 or more.

F. PROJECT CONSULTING ARBORIST: An independent consultant with a degree in a field related to arboriculture, and at least five years field experience in tree preservation or on-site monitoring of public works or construction projects involving tree retention and protection. The Consultant should be an active member in the American Society of Consulting Arborists and International Society of Arboriculture.

1.05 REFERENCE STANDARDS AND GUIDELINES:

A. Contractor shall comply with applicable requirements and recommendations of the most current versions of the following standards and guidelines. Where these conflict with other specified requirements, the more restrictive requirements shall govern.
   1. ANSI Z133.1-1988: American National Standard for Tree Care Operations
   2. ANSI A300-1994: Standard Practices for Trees, Shrubs and Other Woody Plant Materials
   3. NATIONAL ARBORIST ASSOCIATION STANDARDS: Pruning, Cabling and Bracing, Fertilization
   4. GUIDE FOR PLANT APPRAISAL-8TH EDITION: Authored by the Council of Tree and Landscape Appraisers; published by the International Society of Arboriculture

1.06 REFERENCE STANDARDS

A. ANSI Z133.1 - American National Standard For Arboricultural Operations - Pruning, Repairing, Maintaining, And Removing Trees, And Cutting Brush - Safety Requirements; 2012.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. This section provides standards and guidelines for the retention and protection of trees and high-value shrubs for any proposed public works or construction project.

B. All tree pruning, tree removal, and shrub removal within the project limits must occur between:
   1. October 1st and March 31st

3.02 DEMOLITION OF EXISTING CONCRETE

A. Caution should be used during removal of existing street, curb, gutter, sidewalk, drain inlets, and other concrete and asphalt demolition, to minimize injury to tree root systems. The following procedures should be used when removing existing concrete.

B. Breaking of the existing concrete and asphalt for removal should be done in a manner that will minimize ground disturbance and vibration.

C. Curbs and sidewalks within designated tree protection areas and critical root zones shall be removed by hand. When removing existing sidewalks and curbs, care should be taken to avoid injury to roots located under, over, or adjacent to paved surfaces.

D. Roots and root-trunk flares growing over curbs should not be injured during breaking of curbs and removal of debris. Wood and bark tissues shall not be injured by striking tissues with equipment.

E. During the removal of concrete, all root systems and soil areas exposed shall not be disturbed.

F. Motorized equipment and trailers, including tractors, Bobcats, bulldozers, trackhoes, trucks, cars, and carts are to be limited to access on the existing paved street only. Access is not allowed behind the curb within tree protection areas.

G. Should access be necessary within designated tree protection areas, the existing grade shall be covered with double, overlapping sheets of ¾ inch thick plywood, or six (6) to eight (8) inches of wood mulch to help distribute the weight of equipment and to minimize soil compaction and rutting. Plywood and/or mulch is not acceptable bridging material for driving over exposed tree roots. Exposed tree roots shall not be driven over. The City Forester or Project Consulting Arborist shall be notified and shall approve of the access and driving surface prior to its use.

3.03 CONSTRUCTION OF SIDEWALKS, CURBS, CONCRETE, ASPHALT PAVING AND DRAINAGE INLETS

A. The following procedures shall be used when constructing sidewalks, curbs, concrete, asphalt paving, and drainage inlets.
   1. Keep all materials and equipment within the street bounded by existing curbs.
   2. Protect exposed roots from contamination by stabilization materials and concrete.
   3. Locate concrete washout areas away from roots and tree protection areas.
   4. When excavating for the construction of inlets, excavated soil shall be deposited in trucks and hauled off or deposited temporarily on ¾ inch thick plywood outside the critical root zone. Excavated and fill soil shall not be deposited, even temporarily, on unprotected natural grade.
   5. After proper pruning, as needed, cover exposed roots within thirty (30) minutes to minimize desiccation. Roots may be covered with soil, mulch, or moistened burlap (7 ounce or equivalent), and shall be kept moist during the period until the final grade is established.
   6. Where possible, sidewalks should be raised, narrowed, curbed, or relocated to prevent cutting and removing major roots (e.g. roots greater than three inches in diameter).
   7. Place a sheet of six (6) mil or thicker plastic over the grade within affected portions of tree protection areas prior to pouring concrete sidewalks, curbs, inlets, ramps, and driveway approaches. The plastic will assist in providing a non-leaching barrier between the concrete, soil and roots.
   8. Construct new sidewalks on, or above, the existing grade instead of excavating into root zones. The new grade shall not interfere with sheet-flow drainage.
   9. Limit grading to a maximum of two (2) inches of fill over natural grade within critical root zones. Fill should consist of sandy loam topsoil. Clay soils shall not be used as fill. When using fill soil, the existing surface to receive fill should be scarified prior to filling. Any filling operation should not occur during water saturated soil conditions.
   10. Existing soil may be used as a form for back of curb and gutter, with or without the use of a thin masonite-type form, although a masonite form is preferred. This will minimize excavation in the critical root zone and prevent undue injury to the roots. This method is unnecessary in areas outside the critical root zone. Place a layer of Typar BioBarrier between the curb and tree roots to help inhibit root growth that may exploit small cracks in the curb. Where appropriate, use curbs with discontinuous footings to maintain natural grade near the base of trees adjacent to the curbing, and to minimize injury to roots and root flares.
   11. Provide for easy concrete removal and replacement where an obvious raised root may cause sidewalk cracking in the future. This can be accomplished by installing an expansion joint on either side of the root or by etching the concrete on either side of the root to allow that particular section to be broken out and replaced. Compaction rating for the replacement walkway should not exceed 80% Proctor density. Tree roots will continue to slowly add girth every year; therefore, the base material needs to be malleable (e.g. suitable subgrade aggregates, crushed granite, or compacted sand) to prevent a fulcrum or pressure point which can crack or heave the walkway.

12. Where appropriate, and under the direction of the City Forester or Project Consulting Arborist, root restricting barriers can be installed with a minimal amount of disturbance. There are several promising landscape related materials used as barriers to root growth, especially away from sidewalks, curbs and streets. Three such materials are:
    a. a stiff nylon woven fabric (Q899 nylon fabric with extra firm finish from Jason Mills, Westwood, NJ);
    b. 14-mesh or smaller copper wire screen; and
    c. Typar BioBarrier (REEMAY, Inc., Old Hickory, TN). The nylon fabric has holes approximately 1/26th-inch square separated by strands approximately 1/26th-inch thick, with strands fused together. Copper screen has been shown to be effective in controlling seedling root growth. Typar BioBarrier is a commercial product developed specifically to control roots of trees, and consists of a felt-like spun-bounded polypropylene fabric to which polyethylene pellets are attached at one and a half (1½) by one and a half (1½) inch spacing. The pellets are impregnated with the herbicide Trifluralin and release it slowly over time (many years). After a two (2) foot deep, narrow trench is dug adjacent to the curb, sidewalk, or other structure involved, and after any affected roots are properly pruned, the material of choice should be placed against the side of the wall closest to the roots that were severed (side of the wall farthest from the structure being protected). Note: This procedure should not be used if large, existing roots (four (4) inches or larger in diameter) will be severed. The nylon fabric and copper screen will constrict roots to the size of the openings in the material; beyond the constrictions, roots will be greatly stunted except for knobs that form against the barriers. The barrier should be installed at least eighteen (18) to twenty-four (24) inches deep (in a vertical plane).
13. In areas where roots have to be removed for construction of drain inlets, roots shall be severed prior to excavation to eliminate unnecessary tearing of roots by equipment.
    a. Excavate soil by hand at the construction cut limit to a depth of thirty (30) inches or to the depth of the required root cut, whichever is less.
    b. Prune roots as specified in Paragraph 3.5 of this section.
    c. Protect exposed roots as specified in Subparagraph 3.3E of this section.
14. Concrete or chemicals spilled within tree protection areas should be completely removed. Contamination soil shall be completely removed at the time of the spill and removed by hand without disturbance to root systems. Appropriate soil should be added as necessary to restore the grade.

3.04 IRRIGATION OR UTILITY INSTALLATION:

A. PROTECTION OF TREES AND HIGH-VALUE SHRUBS: Contractor shall protect all trees and high-value shrubs from injury due to irrigation related work. All injuries to trees and high-value shrubs shall be mitigated to the satisfaction of the Owner, and, if appropriate in accordance with guidelines established in the "Guide for Plant Appraisal". All costs of such mitigating shall be charged to and paid by the Contractor. See Paragraph 3.9 of this section for definition of high value.
    1. All irrigation lines shall be indicated on construction plans and pre-approved by the City Forester or Project Consulting Arborist. Unless absolutely necessary, no irrigation lines shall be located within 10 feet of any existing tree trunk. (See following paragraphs).

B. EXISTING TREES: The City Forester or Project Consulting Arborist shall be notified prior to any trenching or excavation known or suspected to involve cutting of more than:
    1. two roots, three inches or more in diameter; and/or
    2. four roots between two (2) and three (3) inches in diameter. The City Forester or Project Consulting Arborist shall be notified immediately in the event that roots in excess of that described above are cut, torn, ripped, or otherwise injured.

C. All trenching or other work under the dripline of any tree shall be done by hand or by other methods which will prevent breakage or other injury to branches and roots.

D. Where it is necessary to excavate within the critical root zone of existing trees, contractor shall use all possible care to avoid injury to trees and tree roots. Excavation, in areas where two (2) inch diameter and larger roots occur, shall be done by hand with approved hand tools. Where possible, tree roots two (2) inches or larger in diameter shall be tunneled or bored under and shall be covered with moistened burlap to prevent excessive drying.

E. Wherever a trenching machine exposes roots smaller than two (2) inches in diameter, such roots extending through the trench wall shall be hand pruned (see Paragraph 3.5 of this section). All trenches within critical root zones shall be closed within twelve (12) hours-if this is not possible, the trench walls shall be covered with burlap and kept moistened. Prior to backfilling, Contractor shall contact the City Forester or Project Consulting Arborist to inspect the condition and treatment of roots larger than two (2) inches in diameter injured by trenching.

F. Horizontal directional boring (auger tunneling), rather than open trenching, should be used for irrigation line or other utility installation within one half (½) foot linear distance from the trunk base for every inch of trunk diameter, if root disruption or utility installation occurs on no more than one side of the tree. If trenching or utility installation will occur on two or more sides of a tree trunk (e.g. N,S,E, or W), then horizontal directional boring should be used if line installation is within one (1) foot linear distance from the trunk base for every inch of trunk diameter.

3.05 ROOT PRUNING:

A. Tree roots shall not be pruned or cut unless their removal is unavoidable or absolutely necessary. The City Forester or Project Consulting Arborist shall be notified prior to any operation known or suspected to involve cutting of more than:
   1. two roots, three (3) inches or more in diameter; and/or
   2. four (4) roots between two (2) and three (3) inches in diameter. The City Forester or Project Consulting Arborist shall be notified immediately in the event that roots in excess of that described above are cut, torn, ripped, or otherwise injured.

B. Upon approval by the City Forester, prior to any excavation, removal of sidewalk, or other activity that will result in removal of soil and tree roots, all tree roots within a designated area will be pruned to a depth of fourteen (14) inches. Pruning shall occur with a Dosko Root Pruner, or equivalent, in accessible areas, and by hand in areas inaccessible to the root pruning machine. All other root pruning shall be done by hand with approved tools.

C. Removal of roots greater than one (1) inch diameter or parts of roots that are injured or diseased should be performed as follows:
   1. Preserve the root bark ridge (similar in structure and function to a branch bark ridge). Directional root pruning is the recommendation technique and should be used during hand excavation around tree roots. Roots are similar to branches in their response to pruning practices. With directional root pruning, objectionable and severely injured roots are properly cut to a lateral root, if possible, that is growing downward or in a favorable direction.
   2. All roots needing to be pruned or removed shall be cut cleanly with sharp hand tools, with oversight by the City Forester or Project Consulting Arborist. No wound dressings shall be used.
   3. Recommended root pruning tools:
      a. Scissor-type lopper.
      b. Scissor-type pruner.
      c. Large and small hand saws.
      d. Wound scriber.
      e. Trowel or small shovel.
      f. Garden Fork.
      g. Hand broom.

D. Root Pruning Near Sidewalks
   1. Root pruning should be done carefully, by hand, to achieve the objective of reducing future sidewalk problems as well as preserving the trees. Removing anchoring roots or

causing injuries in anchoring roots and root flares can cause future decay and windthrow hazards. Indiscriminate cutting of vigorous roots results in their resprouting so that several more new roots may grow from the cut end, back under the sidewalk, thereby reducing the time between sidewalk repairs. Roots can be managed in the ground without significant harm to trees, if care is taken to avoid injuries that lead to root and trunk decay.

2. Directional root pruning is recommended because it considers the tree's response to root pruning and decay. With directional root pruning, roots are cut to a large lateral, if possible, that is growing downward or in a more favorable direction. The pruned root ends will be less likely to resprout, since a large lateral can assume the new terminal role of the root.
3. Proper removal of selected roots or parts of roots can direct roots away from sidewalks in the future. Procedures for root pruning directly next to sidewalks are as follows:
    a. Hand dig a trench six (6) to eight (8) inches in depth at the edge of the planting strip and sidewalk.
    b. Remove all roots less than two (2) inches diameter in this trench back to a desirable lateral root, preserving the root bark ridge. If careful excavation does not reveal a desirable lateral root within twelve (12) inches of the exposed root in question, then the exposed root shall be pruned properly so that a minimal amount of root is removed.
    c. Small root bundles, the source of future sidewalk problems, should also be removed at this time.

E. All roots between two (2) and four (4) inches in diameter should be examined by the City Forester or Project Consulting Arborist in terms of their role in anchoring the tree.
1. All roots that contribute significantly to anchorage should be preserved. Remove all other roots in this size range to sound, downward growing lateral roots that are at least one half (½) the size of the root being removed.
2. All roots larger than four (4) inches in diameter are to be preserved unless their removal is absolutely necessary. Preservation of large roots may require:
    a. reducing the sidewalk width near the root flare; and/or
    b. ramping or bridging the sidewalk over the roots to allow for root growth.

F. Tree guying subsequent to root pruning: Upon review of on-site root pruning and constructing grading limits, the City Forester or Project Consulting Arborist shall determine if existing trees subject to root pruning should be guyed or otherwise stabilized. Contractor shall retain a qualified tree service company to complete tree guying and stabilization in accordance with National Arborist Association standards as referenced in Section 5.00.

3.06 TREE PROTECTION FENCING:

A. Tree protection fencing should be installed two (2) feet behind the existing curb in areas where the street surface will be removed and replaced. Tree protection areas shall be designated on construction documents, and fencing locations should be staked for approval by the Construction Manager and City Forester or Project Consulting Arborist.

B. Tree protection fences should be constructed of one of the following:
1. Galvanized chain-link - six (6) feet in height. Posts should be installed on ten (10) foot centers (maximum), at a depth of three (3) feet minimum. Installation of post shall not result in injury to surface roots or root flares of trees.
2. Colored (orange), molded plastic construction fencing-four (4) feet in height.

C. Fencing should be installed to completely surround the limits of tree protection areas, and should extend at least ten (10) feet beyond the designated construction limits.

D. Tree protection fencing shall be installed prior to any site activity and shall remain until its removal is authorized by the City Forester or Project Consulting Arborist.

3.07 TREE PROTECTION SIGNAGE

A. A standard Forestry Tree Protection sign shall be mounted on tree protection fencing at fifty (50) foot intervals warning constructing personnel and the public to keep out of the tree protection areas.

3.08 PROJECT SITE MONITORING

A. As determined by the City Forester for projects of sufficient size to warrant such, a Project Consulting Arborist shall be retained to enforce and monitor the Tree Retention and Protection objectives. The project site should be monitored a minimum of two (2) times weekly-more frequently at the start of the project until all procedures and specifications are understood and properly executed by all parties. Specific monitoring schedules should be developed at preconstruction meetings and modified as deemed necessary by the appropriate parties. Schedules shall be relayed to the City Forester along with reports of site visits.

3.09 INJURIES TO EXISTING PLANTS - DAMAGE PENALTIES:

A. Tree and High-Value Shrub Appraisal: All trees and high-value shrubs will be evaluated and appraised by the City Forester or Project Consulting Arborist, and a list of all tree values for the project will be on file in the Construction Manager's office. Any tree or other plant requiring retention or protection that is not on the list shall be appraised by the City Forester or Project Consulting Arborist as necessary to comply with this damage penalty.

B. Documentation for appraisals will consist of:
   1. measurement of plant size;
   2. identification by common and botanical names;
   3. current condition (overall health, injuries, overt hazard status, etc.) and
   4. location factors as described in the "Guide for Plant Appraisal". Photographs may be taken of certain trees and shrubs to document debilitating condition factors.

C. The threshold level for plants to be appraised shall be $100.00; only those trees and shrubs estimated to have a monetary value greater than $100.00 shall be appraised.

D. Trees and other plants designated as requiring retention or protection shall be identified and located on construction plans. Loss of, or partial injury to, any of these plants due to Contractor neglect or improper construction activities will result in a penalty of up to treble damages of the assessed value of the tree as determined by the City Forester or Project Consulting Arborist.

E. Trees determined as requiring “general protection” or “special protection” in the construction areas and in other key locations should be clearly identified by the City Forester or Project Consulting Arborist. Loss or partial injury to any of these trees due to Contractor neglect or improper construction activities will result in a penalty of up to treble damages for the assessed value of the trees as determined by the City Forester or Project Consulting Arborist. Injury to a portion of these trees will be assessed by the City Forester or Project Consulting Arborist and a corresponding portion of the liquidated damages will be assessed to the Contractor.

F. A fine of one-thousand dollars ($1,000.00) will be levied against the Contractor for each incident of construction damage (including construction traffic) within designated tree protection areas. Any fine shall be independent of any applicable damages for the assessed value of the tree or tree part.

G. Trees or roots visibly and unnecessarily injured will cause the Owner to withhold from the Contractor an assessed amount conforming to the requirements stipulated above, for a period of one full year. After that period the impact of the injury to any tree will be assessed by the City Forester or the Project Consulting Arborist.

3.10 SUBMITTALS:

A. Proposed methods and schedule for effectuating tree and other plant protection shall be submitted for approval. Contractor shall submit construction schedule which includes a time frame for work near existing plants. Approval of such shall be obtained from the City Forester prior to commencement of construction near tree protection areas.

B. Proposed methods, materials, and schedule for root pruning, branch pruning, and other tree maintenance shall be submitted for approval. The City Forester or Project Consulting Arborist shall mark the location of root pruning lines in the field prior to the operation. If possible, root pruning should occur between autumnal leaf fall and spring foliation. Root pruning during the growing season shall require approval of the City Forester or Project Consulting Arborist.

3.11 TREE AND OTHER PLANT MAINTENANCE DURING AND AFTER COMPLETION OF CONSTRUCTION.

A. Proper maintenance should include, but without limitation to: structural and remedial pruning; watering; mulching; remediating soil compaction; fertilization; insect and disease control; soil and tissue analysis; aeration; and wound treatment.

B. The timing duration and frequency of necessary maintenance practices should be determined by the City Forester or Project Consulting Arborist, based on factors associated with the site and affected plants.

END OF SECTION 015639

SECTION 015813
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

1.02 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; sign background of white color.

2.02 PROJECT IDENTIFICATION SIGN

A. One painted sign, 32 sq ft area, bottom 6 feet above ground.

B. Graphic Design, Colors, Style of Lettering: Designated by Landscape Architect.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at location of high public visibility adjacent to main entrance to site.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

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

3.03 REMOVAL

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

END OF SECTION 015813

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. See Section 014000 - Quality Requirements, for additional source quality control requirements.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Construction Instructions to Bidders.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

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

END OF SECTION 016000

SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 014000 - Quality Requirements: Testing and inspection procedures.

C. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.
   1. Minimum of three years of documented experience.

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

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

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Landscape Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Landscape Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

D. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Landscape Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

2. Relocate items indicated on drawings.
3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

D. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Landscape Architect.

E. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

F. Clean existing systems and equipment.

G. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

H. Do not begin new construction in alterations areas before demolition is complete.

I. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Match work that has been cut to adjacent work.
4. Repair areas adjacent to cuts to required condition.
5. Repair new work damaged by subsequent work.
6. Remove samples of installed work for testing when requested.
7. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

E. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Use cleaning materials that are nonhazardous.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean debris from roofs, downspouts, area drains, and drainage systems.

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Notify Landscape Architect when work is considered ready for Landscape Architect's Substantial Completion inspection.

C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Landscape Architect's Substantial Completion inspection.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Landscape Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Landscape Architect.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

F. Notify Landscape Architect when work is considered finally complete and ready for Landscape Architect's Substantial Completion final inspection.

G. Complete items of work determined by Landscape Architect listed in executed Certificate of Substantial Completion.

3.13 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 017000

031000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Responsible for all work in this section, except concrete for electrical features.
   2. Electrical Contractor:
      a. Responsible for work in this section: concrete for electrical features (e.g. concrete pole bases and powered bollard bases).

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
   1. Form-facing material for cast-in-place concrete.
   2. Shoring, bracing, and anchoring.

1.04 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.

1.05 ACTION SUBMITTALS

A. Product Data: For each of the following:
   1. Exposed surface form-facing material.
   2. Concealed surface form-facing material.
   3. Pan-type forms.
   4. Form ties.
   5. Waterstops.
   6. Form-release agent.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.
   1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
   2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
      a. Location of construction joints is subject to approval of the Architect and Structural Engineer.
   3. Indicate location of waterstops.
   4. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspection agency.

B. Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC353.

C. Field quality-control reports.

1.07 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Formwork: Store formwork off ground and under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

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

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
   1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
   1. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

B. Design, engineer, erect, shore, brace, and maintain insulating concrete forms in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

2.02 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:
   1. Provide continuous, true, and smooth concrete surfaces.
   2. Furnish in largest practicable sizes to minimize number of joints.
   3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
      a. Plywood, metal, or other approved panel materials.
      a. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
         1) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
   1. Provide lumber dressed on at least two edges and one side for tight fit.

2.03 RELATED MATERIALS

A. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

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

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

E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
   2. Form release agent for form liners shall be acceptable to form liner manufacturer.

F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

PART 3 EXECUTION

3.01 INSTALLATION OF FORMWORK

A. Comply with ACI 301.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.

C. Limit concrete surface irregularities as follows:
   1. Surface Finish-3.0: ACI 117 Class A, 1/8 inch

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

E. Construct removable 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 keyways, reglets, recesses, 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. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
   1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
   2. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

K. 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 Architect prior to forming openings not indicated on Drawings.

L. Construction and Movement Joints:
   1. Construct joints true to line with faces perpendicular to surface plane of concrete.
   2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect and Structural Engineer.
   3. Place joints perpendicular to main reinforcement.

4. 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 as indicated on Drawings. Joint layout shall be reviewed by the Architect and Structural Engineer prior to construction in the form of a construction joint layout shop drawing submittal.
    a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

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

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

P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 INSTALLATION OF EMBEDDED ITEMS

A. 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 in Section 7.5 of AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

3.03 INSTALLATION OF WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.
1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
4. Secure waterstops in correct position at 12 inches (305 mm) on center.
5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.
    a. Miter corners, intersections, and directional changes in waterstops.
    b. Align center bulbs.
6. Clean waterstops immediately prior to placement of concrete.
7. Support and protect exposed waterstops during progress of the Work.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Protect exposed waterstops during progress of the Work.

3.04 REMOVING AND REUSING FORMS

A. 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 support weight of concrete in place until concrete has achieved at least 70 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 are unacceptable 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 Architect.

3.05 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

B. 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.

3.06 FIELD QUALITY CONTROL

A. Special Inspections: User Agency will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.

END SECTION

032000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Responsible for all work in this section, except concrete for electrical features.
   2. Electrical Contractor:
      a. Responsible for work in this section: concrete for electrical features (e.g. concrete pole bases and powered bollard bases).

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SUMMARY

A. Section Includes:
   1. Steel reinforcement bars.

B. Related Requirements:
   1. Section 033000 "Cast-In-Place Concrete" for reinforcing used in cast-in-pace structural concrete.

1.03 ACTION SUBMITTALS

A. 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.

B. Shop Drawings: Comply with ACI SP-066:
   1. Include placing drawings that detail fabrication, bending, and placement.
   2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

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

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

B. Welding certificates.
   1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4.

C. Material Certificates: For each of the following, signed by manufacturers:
   1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
   2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

D. 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.

E. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
   1. Store reinforcement to avoid contact with earth.
   2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
   3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

PART 2 PRODUCTS

2.01 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60 deformed.

B. Epoxy-Coated Reinforcing Bars:
   1. Steel Bars: ASTM A615, Grade 60 deformed bars.
   2. Epoxy Coating: ASTM A775 with less than 2 percent damaged coating in each 12-inch bar length.

2.02 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place.
   1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with 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, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
      b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
   2. Finish: Plain

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

C. Zinc Repair Material: ASTM A780.

2.03 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.
   1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
   1. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Splices: Lap splices as indicated on Drawings.
   1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
   2. Stagger splices in accordance with ACI 318 and the Structural Drawings.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963.

3.03 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect and Structural Engineer.
   1. Place joints perpendicular to main reinforcement.
   2. Continue reinforcement across construction joints unless otherwise indicated.

3.04 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.05 FIELD QUALITY CONTROL

A. Special Inspections: User Agency will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
   1. Steel-reinforcement placement.
      a. Reinforcement bar size
      a. Reinforcement bar spacing
      b. Reinforcement bar lengths
      c. Reinforcement bar lap splice lengths

END SECTION

032010
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Deformed steel reinforcing bars for cast-in-place concrete footings, piers, pedestals, and other structural concrete indicated on the Drawings.
   2. Welded wire reinforcement where indicated.
   3. Bar supports, tie wire, and reinforcing accessories.

B. Related Requirements:
   1. Section 03 30 10 - Cast-in-Place Concrete.
   2. Section 05 12 00 - Structural Steel Framing, for anchor rods, embedded plates, and steel items cast into or attached to concrete.

C. Coordinate reinforcing Work with construction joints, openings, anchor rods, embedded plates, structural steel, deck framing, and Phase 2 canopy construction indicated on the Drawings.

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.
   2. ACI 301 - Specifications for Concrete Construction.
   3. ACI 315R - Guide to Presenting Reinforcing Steel Design Details.
   4. ACI 318-19 - Building Code Requirements for Structural Concrete.

B. American Welding Society (AWS):
   1. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars.

C. ASTM International (ASTM):
   1. ASTM A615 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   2. ASTM A706 - Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
   3. ASTM A775 - Epoxy-Coated Steel Reinforcing Bars.
   4. ASTM A884 - Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
   5. ASTM A1064 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

D. Concrete Reinforcing Steel Institute (CRSI):
   1. Manual of Standard Practice.
   2. Placing Reinforcing Bars.

1.03 SUBMITTALS

A. Shop Drawings: Submit checked reinforcing steel shop drawings prepared in accordance with ACI 315R and CRSI.
   1. Show bar sizes, grades, quantities, spacing, bending details, hooks, supports, concrete cover, and placing dimensions.
   2. Show locations and lengths of lap splices, mechanical splices if proposed, construction joints, openings, dowels, and reinforcement interruptions.
   3. Identify epoxy-coated reinforcement and accessories.
   4. Coordinate shop drawings with anchor rods, embedded plates, sleeves, and other embedded items. Do not use structural drawings as placing drawings.

B. Product Data: Submit manufacturer information for bar supports, mechanical splices if proposed, epoxy-coating repair materials, and other proprietary accessories.

C. Mill Certificates: Submit certified mill test reports for each heat of reinforcing steel and welded wire reinforcement.

D. Epoxy-Coating Certification: Submit certification that coated reinforcement complies with specified ASTM requirements.

E. Welding Submittals: Where welding is indicated or approved, submit welding procedures and welder qualifications in accordance with AWS D1.4/D1.4M.

1.04 QUALITY ASSURANCE

A. Perform reinforcing steel Work in accordance with ACI 301, ACI 318-19, ACI 315R, and CRSI, except where more stringent requirements are indicated.

B. Fabricator: Experienced in fabrication of reinforcing steel for work of similar size and complexity.

C. Welding of reinforcing bars is permitted only where indicated or specifically approved by the Structural Engineer of Record.
   1. Use ASTM A706 Grade 60 bars for reinforcement that is welded. Do not weld ASTM A615 bars.
   2. Do not tack weld crossing bars.

D. Special Inspections: Provide inspections required by the applicable building code and approved Statement of Special Inspections.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement bundled, tagged, and marked to identify bar size, length, shape, grade, heat number, and location of use.

B. Store reinforcement off the ground and protect from mud, oil, grease, ice, loose scale, and other bond-reducing materials.

C. Handle epoxy-coated reinforcement with padded equipment and nonmetallic slings. Prevent abrasion, impact, and damage to coating.

D. Repair damaged epoxy coating using patching material compatible with the coating system and recommended by the coating manufacturer.

PART 2 PRODUCTS

2.01 REINFORCING MATERIALS

A. Deformed Reinforcing Bars: ASTM A615, Grade 60.

B. Weldable Reinforcing Bars: ASTM A706, Grade 60, where welding is indicated or approved.

C. Epoxy-Coated Reinforcing Bars: ASTM A775 over ASTM A615 or ASTM A706 bars, as applicable.
   1. Provide epoxy-coated reinforcement where concrete is exposed to the elements and at other locations indicated on the Drawings.

D. Welded Wire Reinforcement: ASTM A1064, plain or deformed as indicated.

E. Epoxy-Coated Welded Wire Reinforcement: ASTM A884 where concrete is exposed to the elements or where indicated.

F. Tie Wire: Annealed steel wire, minimum 16 gage.
   1. Use epoxy-coated or plastic-coated tie wire with epoxy-coated reinforcement.

G. Bar Supports: CRSI-compliant chairs, bolsters, spacers, and accessories sized and spaced to maintain reinforcement in the indicated position during concrete placement.
   1. For reinforcement supported on soil or aggregate base, use precast concrete supports with compressive strength not less than the concrete being placed and with height equal to required cover.
   2. For concrete surfaces exposed to weather or view, use plastic-protected, epoxy-coated, or stainless-steel supports that do not stain or corrode the concrete surface.
   3. Do not use brick, concrete masonry units, wood, broken concrete, or other unapproved materials as supports.

H. Epoxy-Coating Repair Material: Two-component material recommended by the coating manufacturer and compatible with ASTM A775 or ASTM A884 coating, as applicable.

2.02 FABRICATION

A. Fabricate reinforcement accurately to shapes and dimensions indicated on approved shop drawings and within ACI 315R and ACI 318-19 tolerances.

B. Bend reinforcement cold using equipment that does not damage the bars or coating.

C. Do not field bend or straighten reinforcement partially embedded in concrete unless specifically approved by the Structural Engineer of Record.

D. Do not heat reinforcement for bending or straightening.

E. Do not use bars with kinks or bends not indicated on approved shop drawings.

F. Fabricate and handle epoxy-coated reinforcement to minimize coating damage. Repair cut ends and damaged coating before concrete placement.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that forms, subgrade, vapor retarder where applicable, construction joints, openings, embedded items, and anchor-rod templates are complete and ready to receive reinforcement.

B. Notify the Engineer and special inspector not less than 48 hours before concrete placement. Do not place concrete until reinforcement has been inspected and deficiencies corrected.

3.02 PREPARATION

A. Clean reinforcement of mud, oil, grease, ice, loose rust, loose mill scale, and other materials that reduce bond.

B. Remove concrete splatter and other hardened materials that interfere with bond or required clearances.

C. Repair damaged epoxy coating before placing reinforcement or concrete.

3.03 PLACEMENT

A. Place reinforcement accurately in accordance with the Drawings, approved shop drawings, ACI 301, ACI 318-19, and CRSI.

B. Secure reinforcement against displacement by tying and supporting it before concrete placement. Lifting bars or welded wire reinforcement into position during concrete placement is not permitted.

C. Maintain bar spacing, alignment, and concrete cover indicated on the Drawings. Where not indicated, provide cover required by ACI 318-19.

D. Support reinforcement independently of anchor rods, embedded plates, conduits, sleeves, and other embedded items.

E. Do not place reinforcement directly on formwork, soil, aggregate base, or vapor retarder.

F. Continue reinforcement through construction joints unless otherwise indicated. Terminate reinforcement at expansion joints.

G. Install dowels between footings and piers as indicated. Where noted on the Drawings, dowels shall match the vertical pier reinforcement.

H. Place reinforcement to avoid interference with anchor rods and embedded steel. Do not cut, bend, relocate, or omit reinforcement to clear obstructions without written approval from the Structural Engineer of Record.

I. Provide additional reinforcement around openings as indicated on the Drawings. Obtain approval before creating openings not indicated.

J. Place welded wire reinforcement in flat sheets where practicable, support at the indicated elevation, and lap in accordance with the Drawings and ACI 318-19.

3.04 SPLICES AND CONNECTIONS

A. Provide lap splices only at locations indicated on the Drawings or approved shop drawings and in accordance with ACI 318-19.

B. Stagger splices where practicable and locate away from regions of maximum tensile stress.

C. Do not splice reinforcement by welding unless indicated or specifically approved.

D. Mechanical splices, where proposed, require prior approval and shall develop the strength required by ACI 318-19 for the application.

E. Tie reinforcement intersections securely with annealed wire or approved clips. Use coated ties with epoxy-coated reinforcement.

3.05 EPOXY-COATED REINFORCEMENT

A. Use padded supports, coated tie wire, and nonmetallic handling equipment to prevent coating damage.

B. Repair coating damage, cut ends, and exposed steel with approved patching material before concrete placement.

C. Replace bars having coating damage that cannot be repaired in accordance with the coating standard and manufacturer instructions.

3.06 FIELD QUALITY CONTROL

A. Special Inspector shall verify reinforcement grade, coating, size, quantity, spacing, placement, concrete cover, supports, hooks, and splices before concrete placement.

B. Correct misplaced, damaged, contaminated, or inadequately supported reinforcement before placing concrete.

C. Do not conceal nonconforming reinforcement. Changes require review and written acceptance by the Structural Engineer of Record.

3.07 CLEANING AND PROTECTION

A. Protect installed reinforcement from construction traffic, displacement, contamination, and damage until concrete is placed.

B. Maintain reinforcement in a clean condition and resecure displaced bars before concrete placement.

END SECTION

033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Responsible for all work in this section, except concrete for electrical features.
   2. Electrical Contractor:
      a. Responsible for work in this section: concrete for electrical features (e.g. concrete pole bases and powered bollard bases).

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SUMMARY

A. Section Includes:
   1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
   1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
   2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
   3. Section 034500 "Precast Architectural Concrete" for general building applications of specially finished precast concrete.

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. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.04 ACTION SUBMITTALS

A. Product Data: For each of the following.
   1. Portland cement.
   2. Aggregates.
   3. Admixtures:
      a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
   4. Curing materials.

B. Design Mixtures: For each concrete mixture, include the following:
   1. Mixture identification.
   2. Minimum 28-day compressive strength.
   3. Durability exposure class.
   4. Maximum w/cm.
   5. Calculated equilibrium unit weight, for lightweight concrete.
   6. Slump limit.
   7. Air content.
   8. Nominal maximum aggregate size.
   9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.

10. Intended placement method.

C. Shop Drawings:
   1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
      a. Location of construction joints is subject to approval of the Structural Engineer.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
   1. Concrete Class designation.
   2. Location within Project.
   3. Exposure Class designation.
   4. Formed Surface Finish designation and final finish.
   5. Curing Process

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:
   1. Installer: Include copies of applicable ACI certificates.
   2. Ready-mixed concrete manufacturer.
   3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Curing compounds.
   4. Bonding agents.

C. Research Reports:
   1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.
   1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94 and ACI 301.

1.08 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows:
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   2. 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.
   3. Do not use frozen materials or materials containing ice or snow.

4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 PRODUCTS

2.01 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.02 CONCRETE MATERIALS

A. Source Limitations:
1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
1. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
2. Obtain aggregate from single source.
3. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:
1. Portland Cement: ASTM C150, Type I/III

C. Normal-Weight Aggregates: ASTM C33, coarse aggregate or better, graded. Provide aggregates from a single source.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do 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 C494, Type A.
2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.
7. Color: As selected by Architect from manufacturer's full range.

F. Water and Water Used to Make Ice: ASTM C94, potable

2.03 CURING MATERIALS

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

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

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

D. Curing Paper: 8-feet wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

E. Water: Potable or complying with ASTM C1602.

2.04 RELATED MATERIALS

A. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.05 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, in accordance with ACI 301.
   1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
   1. Use water-reducing 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.

2.06 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings.
   1. Exposure Class: ACI 318 F2, C1
   2. Minimum Compressive Strength: 4500 psi at 28 days.
   3. Maximum w/cm: 0.45.
   4. Air Content:
      a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size

B. Class B: Normal-weight concrete used for foundation walls.
   1. Exposure Class: ACI 318 F2, C1.
   2. Minimum Compressive Strength: 4500 psi at 28 days.
   3. Maximum w/cm: 0.45.
   4. Air Content:
      a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.

2.07 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 and furnish batch ticket information.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
   2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. 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 in Section 7.5 of ANSI/AISC 303.
   3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.04 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

3.05 JOINTS

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

B. Construction Joints: Coordinate with pattern and concrete placement sequence.
   1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect and Structural Engineer.
   2. Place joints perpendicular to main reinforcement.
      a. Continue reinforcement across construction joints unless otherwise indicated.
   3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   4. Locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
   5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Notify Architect, Structural Engineer, and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Structural Engineer in writing, but not to exceed the amount indicated on the concrete delivery ticket.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
   1. If a section cannot be placed continuously, provide construction joints as indicated.
   2. Deposit concrete to avoid segregation.

3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. 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.

3.07 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:
1. Smooth Form Finish: The form facing material shall produce a smooth, hard, uniform texture on the concrete. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. Surface textures that result from forms with raised grain, torn surfaced, worn edges, patches, dents, or other defects shall be ground smooth or otherwise repaired.
2. ACI 301 (ACI 301M) Surface Finish SF-3.0:
    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/8 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 Class A.

B. Locations: Apply to concrete surfaces exposed to public view and as indicated in drawings to receive a rubbed finish. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:
1. Smooth-Rubbed Finish:
    a. Perform no later than one day after form removal.
    b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
    d. Maintain required patterns or variances as shown on Drawings or to match mockups.
        1) Light Texture: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color, with maximum reveal of 1/16 inch
    e. Maintain required patterns or variances in reveal projection to match mockups.

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

3.08 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
   1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
   2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
   3. If forms remain during curing period, moist cure after loosening forms.
   4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
      a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
      b. Continuous Sprinkling: Maintain concrete surface continuously wet.
      c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
      d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
      e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
         1) Recoat areas subject to heavy rainfall within three hours after initial application.
         2) Maintain continuity of coating and repair damage during curing period.

3.09 TOLERANCES

A. Conform to ACI 117.

3.10 CONCRETE SURFACE REPAIRS

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

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water 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. Before repairing surfaces, contractor shall test repair technique on a mockup.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
      a. Limit cut depth to 3/4 inch and do not cut or damage reinforcing bars.
      b. Make edges of cuts perpendicular to concrete surface.
      c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
      d. Fill and compact with patching mortar before bonding agent has dried.
      e. 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 matches surrounding color.
      a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
      b. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect and Structural Engineer.

D. Perform structural repairs of concrete, subject to approval by the Architect and Structural Engineer, using epoxy adhesive and patching mortar.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: User Agency will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
   1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
   2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
   3. Testing agency to report results of tests and inspections, in writing, to User Agency, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
      a. Test reports to include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:
         1) Project name.
         2) Name of testing agency.
         3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
         4) Name of concrete manufacturer.
         5) Date and time of inspection, sampling, and field testing.
         6) Date and time of concrete placement.
         7) Location in Work of concrete represented by samples.
         8) Date and time sample was obtained.
         9) Truck and batch ticket numbers.
         10) Design compressive strength at 28 days.
         11) Concrete mixture designation, proportions, and materials.
         12) Field test results.
         13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
         14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:
   1. Headed bolts and studs.
   2. Verification of use of required design mixture.
   3. Concrete placement, including conveying and depositing.
   4. Curing procedures and maintenance of curing temperature.
   5. Verification of concrete strength before removal of shores and forms from beams and slabs.
   6. Batch Plant Inspections: On a random basis, as determined by Architect.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 to be performed in accordance with 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 provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C143:
      a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
      b. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231 pressure method, for normal-weight concrete;
    a. 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 C1064:
    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31:
    a. Cast and laboratory cure two sets of three 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M.
    a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
    b. Test one set of three field-cured specimens at seven days and one set of two specimens at 28 days.
    c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. 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 if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests:
    a. Testing and inspecting agency to 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 Architect and Structural Engineer.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C4 or by other methods as directed by Architect and Structural Engineer.
        1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.12 PROTECTION

A. Protect concrete surfaces as follows:
    1. Protect from petroleum stains.
    2. Diaper hydraulic equipment used over concrete surfaces.
    3. Prohibit use of pipe-cutting machinery over concrete surfaces.
    4. Prohibit placement of steel items on concrete surfaces.
    5. Prohibit use of acids or acidic detergents over concrete surfaces.

END SECTION

033010
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Cast-in-place normal-weight concrete for structural foundations, footings, piers, pedestals, exterior slabs, and miscellaneous concrete indicated on the Drawings.
   2. Concrete placement, finishing, curing, field quality control, and repair of cast-in-place concrete.

B. Related Requirements:
   1. Section 03 20 10 - Concrete Reinforcing.
   2. Section 05 12 00 - Structural Steel Framing, for anchor rods, embedded plates, and steel items attached to concrete.
   3. Division 31 Sections, subgrade preparation, and ground improvement.

C. Coordinate concrete Work with embedded items, anchor rods, structural steel, deck framing, and future canopy construction indicated on the Drawings.

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.
   2. ACI 301 - Specifications for Concrete Construction.
   3. ACI 305.1 - Specification for Hot Weather Concreting.
   4. ACI 306.1 - Standard Specification for Cold Weather Concreting.
   5. ACI 308.1 - Specification for Curing Concrete.
   6. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International (ASTM):
   1. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.
   2. ASTM C33 - Concrete Aggregates.
   3. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens.
   4. ASTM C94 - Ready-Mixed Concrete.
   5. ASTM C143 - Slump of Hydraulic-Cement Concrete.
   6. ASTM C150 - Portland Cement.
   7. ASTM C171 - Sheet Materials for Curing Concrete.
   8. ASTM C172 - Sampling Freshly Mixed Concrete.
   9. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.
   10. ASTM C260 - Air-Entraining Admixtures for Concrete.
   11. ASTM C494 - Chemical Admixtures for Concrete.
   12. ASTM C595 - Blended Hydraulic Cements.
   13. ASTM C618 - Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
   14. ASTM C989 - Slag Cement for Use in Concrete and Mortars.
   15. ASTM C1064 - Temperature of Freshly Mixed Hydraulic-Cement Concrete.
   16. ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
   17. ASTM C1602 - Mixing Water Used in the Production of Hydraulic Cement Concrete.
   18. ASTM E329 - Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer data and installation instructions for admixtures, curing materials, nonshrink grout, bonding agents, and repair materials.

B. Concrete Mix Designs: Submit a separate mix design for each concrete class and intended use not less than 14 days before placement.
   1. Identify cementitious materials, aggregates, admixtures, design strength, water-cementitious materials ratio, slump, air content, and unit weight.
   2. Include supporting strength data prepared in accordance with ACI 301.
   3. Identify concrete exposure categories and classes used to establish mix requirements.
   4. Resubmit mix designs when materials, proportions, sources, or admixtures change.

C. Placement Plan: Submit proposed placement sequence and locations of construction joints not indicated on the Drawings.

D. Embedded Item Coordination: Submit coordinated information for anchor rods, templates, embedded plates, sleeves, and other items cast into concrete.

E. Batch Tickets: Provide batch tickets for each load in accordance with ASTM C94.

F. Field Quality-Control Reports: Submit testing and inspection reports promptly after testing.

G. Repair Procedures: Submit proposed materials and procedures before repairing structural defects, honeycombing, voids, cracks, misplaced embedded items, or other nonconforming concrete.

1.04 QUALITY ASSURANCE

A. Perform concrete Work in accordance with ACI 301, except where more stringent requirements are indicated.

B. Ready-Mixed Concrete Producer: Comply with ASTM C94.

C. Testing Agency: Qualified in accordance with ASTM E329 and acceptable to the Owner.

D. Special Inspections: Provide inspections required by the applicable building code and the approved Statement of Special Inspections.

E. Do not change approved materials, sources, or mixture proportions without prior review of a revised mix design.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete in accordance with ASTM C94. Record water and admixtures added at the Project site on the batch ticket.

B. Store cementitious materials, aggregates, admixtures, curing materials, and grout to prevent contamination, deterioration, and moisture intrusion.

C. Protect reinforcing steel, anchor rods, and embedded items from mud, oil, ice, loose rust, and other materials that impair bond.

1.06 FIELD CONDITIONS

A. Notify the Engineer and testing agency not less than 48 hours before each concrete placement.

B. Do not place concrete until required ground improvement has been completed and accepted, and footing bearing surfaces have been reviewed by the geotechnical representative.

C. Maintain excavations in a dry condition. Do not place concrete on frozen, disturbed, softened, muddy, or water-covered bearing surfaces.

D. Comply with ACI 305.1 for hot-weather concreting and ACI 306.1 for cold-weather concreting.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cementitious Materials:
   1. Portland Cement: ASTM C150, Type I or Type II.

2. Blended Hydraulic Cement: ASTM C595, Type IL, as an alternate to Portland cement.
3. Fly Ash: ASTM C618, Class F.
4. Slag Cement: ASTM C989, Grade 100 or Grade 120.
5. Use one brand and source of cementitious materials for concrete exposed to view.

B. Normal-Weight Aggregates: ASTM C33, from a single source, graded to produce dense concrete without segregation.

C. Water: ASTM C1602; clean and potable or demonstrated suitable for concrete production.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: ASTM C494.
1. Use nonchloride admixtures only.
2. Do not use calcium chloride or admixtures containing intentionally added chlorides.
3. Use admixtures in accordance with manufacturer recommendations and the approved mix design.

2.02 CONCRETE MIXTURES

A. Prepare concrete mixtures in accordance with ACI 301 and ACI 318.

B. Provide air-entrained, normal-weight concrete for all structural foundations and exterior concrete.

C. Foundations, Footings, Piers, and Pedestals:
1. Minimum Compressive Strength at 28 Days: 4,500 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Air Content: 6 percent, plus or minus 1.5 percent.

D. Exterior Concrete, Including Exterior Slabs, Stairs, Pavements, and Concrete Exposed to Weather:
1. Minimum Compressive Strength at 28 Days: 4,500 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3. Air Content: 6 percent, plus or minus 1.5 percent.

E. Nominal Maximum Coarse Aggregate Size: 3/4 inch, unless a smaller size is required by reinforcement spacing or placement conditions.

F. Slump: 4 inches, plus or minus 1 inch, before addition of high-range water-reducing admixture.
1. Concrete containing an approved high-range water-reducing admixture may have a slump up to 8 inches, provided the approved water-cementitious materials ratio is not exceeded.

G. Supplementary Cementitious Materials: Limit fly ash to 25 percent, slag cement to 40 percent, and total supplementary cementitious materials to 40 percent of total cementitious materials, unless otherwise approved.

H. Do not add water at the Project site when the addition would exceed the approved water-cementitious materials ratio or specified slump.

2.03 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C171, waterproof paper, polyethylene film, or white burlap-polyethylene sheet.

B. Water: Potable.

C. Curing Compound: ASTM C309, Type 1, clear or translucent without dye, compatible with subsequent finishes.
1. Do not use curing compound on surfaces receiving bonded toppings, coatings, sealers, waterproofing, grout, or other materials requiring bond unless specifically approved as compatible.

2.04 NONSHRINK GROUT

A. Nonmetallic, factory-packaged, hydraulic-cement grout complying with ASTM C1107.

B. Minimum Compressive Strength at 28 Days: 5,000 psi.

C. Provide consistency recommended by the manufacturer for the intended application and grout thickness.

2.05 REPAIR AND BONDING MATERIALS

A. Cementitious Repair Material: Prepackaged, polymer-modified repair mortar compatible with the concrete substrate and suitable for exterior freeze-thaw exposure.

B. Epoxy Bonding Agent: ASTM C881, type and grade recommended for the application.

C. Use repair and bonding materials only as part of an approved repair procedure.

2.06 SOURCE QUALITY CONTROL

A. Establish concrete mixture proportions using field experience or laboratory trial batches in accordance with ACI 301.

B. Adjust mixture proportions as necessary to maintain specified strength, durability, workability, air content, and water-cementitious materials ratio. Submit revised mix designs before use.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify forms, reinforcement, construction joints, embedded items, anchor rods, bearing surfaces, and dimensions are complete and ready to receive concrete.

B. Verify inspections required before placement have been completed.

C. Do not proceed with placement until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove water, ice, mud, debris, laitance, loose material, and other substances that could impair concrete placement or bond.

B. Moisten absorptive subgrades and previously placed concrete without leaving standing water.

C. Secure reinforcement and embedded items against displacement. Use rigid templates for anchor rods.

D. Protect anchor rod threads during concrete placement and finishing.

E. Construction Joints:
   1. Locate as indicated on the Drawings or as approved by the Engineer.
   2. Do not provide horizontal construction joints in footings unless specifically approved.
   3. Prepare existing concrete surfaces by removing laitance and unsound material, roughening where required, cleaning, and bringing the surface to a saturated-surface-dry condition before placing new concrete.

F. Do not embed aluminum items in concrete unless they are coated or otherwise isolated to prevent reaction with concrete.

3.03 CONCRETE PLACEMENT

A. Place concrete in accordance with ACI 301 and ACI 304R.

B. Deposit concrete continuously and as close as practical to its final position. Prevent segregation and loss of mortar.

C. Limit free fall to 5 feet unless suitable equipment is used to prevent segregation.

D. Consolidate concrete using mechanical vibrators. Do not use vibrators to transport concrete horizontally.

E. Place concrete around reinforcement, anchor rods, and embedded items without displacement.

F. Place footings and associated piers or pedestals monolithically where indicated.

G. Do not place concrete on frozen subgrade, standing water, or disturbed bearing material.

H. Site Water Addition:

1. Permitted only when authorized by the concrete producer and within the approved mixture limitations and ASTM C94.
2. Mix for not less than 30 revolutions after water or admixture is added. Record the addition on the batch ticket.

I. Hot-Weather Placement: Comply with ACI 305.1.

J. Cold-Weather Placement: Comply with ACI 306.1.

3.04 FINISHING

A. Formed Surfaces:
1. Concealed Surfaces: Rough-form finish with fins and projections removed.
2. Surfaces Exposed to View: Smooth-form finish; fill tie holes and repair surface defects to match adjacent concrete.

B. Unformed Slab Surfaces:
1. Strike off and float to required elevations and slopes.
2. Provide a uniform broom finish for exterior walking surfaces unless otherwise indicated.
3. Do not add water to slab surfaces during finishing.

C. Finish concrete to drain without birdbaths or unintended low points.

3.05 CURING AND PROTECTION

A. Begin curing immediately after finishing and as soon as conditions permit without damaging the concrete surface.

B. Cure concrete continuously for not less than seven days in accordance with ACI 308.1.

C. Use water curing, moisture-retaining covers, or curing compound appropriate for the surface and subsequent finish.

D. Maintain concrete temperature and moisture conditions required for strength development and durability.

E. Protect fresh concrete from precipitation, freezing, excessive heat, rapid moisture loss, vibration, impact, and construction loads.

F. Do not permit construction loads until concrete has attained sufficient strength for the imposed loads.

3.06 TOLERANCES

A. Comply with ACI 117 and tolerances indicated on the Drawings.

B. Survey anchor rods and embedded plates before steel erection. Do not bend, heat, cut, weld, or relocate anchor rods without written approval from the Engineer.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: The Owner will engage a qualified independent testing agency unless otherwise indicated in the Contract Documents.

B. Sampling: Obtain composite samples in accordance with ASTM C172.

C. Strength Test Specimens: Mold and cure four cylinders for each strength test in accordance with ASTM C31.
1. Test one cylinder at 7 days for information, two cylinders at 28 days for acceptance, and retain one cylinder for additional testing when directed.
2. Test compressive strength in accordance with ASTM C39.

D. Testing Frequency: One strength test for each 50 cubic yards or fraction thereof of each concrete mixture placed in one day, but not less than one strength test for each separate placement.

E. Fresh Concrete Tests:
1. Slump: ASTM C143; test each truck at arrival and whenever consistency appears to vary.
2. Air Content: ASTM C231; test each truck containing air-entrained concrete at arrival.

3. Concrete Temperature: ASTM C1064; test each composite sample and as required for hot- or cold-weather placement.

F. Record concrete mixture, batch time, sample location, slump, air content, temperature, cylinder identification, and test results.

G. Immediately notify the Contractor and Engineer of test results or observed Work that does not comply with the Contract Documents.

H. Evaluate and accept concrete strength in accordance with ACI 318 and ACI 301.

I. When test results indicate nonconforming concrete, the Engineer may require additional testing, evaluation, strengthening, repair, or removal. Costs resulting from nonconforming Work shall be borne by the Contractor.

3.08 REPAIR OF DEFECTIVE CONCRETE

A. Notify the Engineer promptly after forms are removed of honeycombing, voids, cracks, spalls, misplaced embedded items, dimensional errors, or other defects.

B. Do not repair structural concrete or conceal defects until the proposed repair procedure has been reviewed by the Engineer.

C. Remove loose and unsound concrete to sound material. Prepare substrates and place approved repair materials in accordance with manufacturer instructions.

D. Match repaired surfaces to adjacent concrete in profile, texture, and appearance where exposed to view.

E. The Engineer may require removal and replacement when defects impair strength, durability, serviceability, appearance, or intended use.

3.09 FIELD MODIFICATIONS

A. Do not drill, core, sawcut, chip, notch, or otherwise modify structural concrete without prior written approval from the Structural Engineer of Record.

B. Post-installed anchors are permitted only where indicated or specifically approved. Install in accordance with the approved product evaluation report and manufacturer instructions, including required special inspection.

3.10 CLEANING AND PROTECTION

A. Remove concrete splatter and stains from adjacent construction before they harden.

B. Protect completed concrete from damage by subsequent construction. Repair or replace damaged Work as directed by the Engineer.

END SECTION

051200
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Structural steel framing for the elevated deck, including beams, girders, channels, angles, plates, stiffeners, connection material, and related structural steel indicated on the Drawings.
   2. Structural steel framing for the pavilion canopy, including columns, beams, WT members, round hollow structural sections, plates, connection material, and related components indicated on the Drawings.
   3. Temporary and permanent structural steel framing associated with phased deck construction and future canopy-column openings.
   4. Coordination with Section 05 12 13 for Category AESS 3 canopy steel, visible welds, and aesthetic requirements indicated on the Drawings.
   5. Anchor rods, base plates, leveling devices, and nonshrink grout associated with structural steel.

B. Related Requirements:
   1. Section 03 30 10 - Cast-in-Place Concrete.
   2. Section 03 20 10 - Concrete Reinforcing.
   3. Section 05 12 13 - Architecturally Exposed Structural Steel, for Category AESS 3 appearance, mockups, handling, galvanizing finish quality, and aesthetic acceptance.

C. Coordinate Work with deck elevations, decking, railings, lighting openings, canopy geometry, concrete foundations, embedded items, and phased construction indicated on the Drawings.

1.02 REFERENCES

A. American Institute of Steel Construction (AISC):
   1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges, including Chapter 10 requirements for Architecturally Exposed Structural Steel.
   2. AISC 360-22 - Specification for Structural Steel Buildings.
   3. AISC Steel Construction Manual.

B. American Welding Society (AWS):
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
   2. AWS D1.1/D1.1M:2020 - Structural Welding Code - Steel.

C. ASTM International (ASTM):
   1. ASTM A36 - Carbon Structural Steel.
   2. ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM A384/A384M - Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
   4. ASTM A385/A385M - Providing High-Quality Zinc Coatings by Hot-Dip Galvanizing.
   5. ASTM A780/A780M - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
   6. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   7. ASTM A992 - Structural Steel Shapes.
   8. ASTM F1554 - Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
   9. ASTM F3125 - High Strength Structural Bolts and Assemblies.
   10. ASTM F2329/F2329M - Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
   11. ASTM D6386 - Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

12. ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

D. Research Council on Structural Connections (RCSC):
   1. Specification for Structural Joints Using High-Strength Bolts, 2020 edition.

E. Association for Materials Protection and Performance (AMPP), formerly SSPC:
   1. Surface-preparation standards indicated by the coating manufacturer and the Architectural coating specifications.

1.03 SUBMITTALS

A. Shop Drawings: Submit complete structural steel fabrication and erection drawings prepared and checked under the supervision of a Professional Engineer licensed in Illinois.
   1. Show member sizes, grades, piece marks, dimensions, elevations, cambers, holes, copes, cuts, welds, bolts, connection details, base plates, anchor rods, erection sequence, and temporary bracing requirements.
   2. Show deck framing and canopy framing separately and identify permanent, temporary, and Phase 2 Work.
   3. Identify members, connections, and welds designated as Category AESS 3 and provide the aesthetic information required by Section 05 12 13.
   4. Show hot-dip galvanizing requirements, vent and drain holes, surfaces inaccessible after assembly, field-weld areas, slip-critical faying surfaces, duplex coating limits, and procedures for repairing damaged galvanizing and coating.
   5. Coordinate shop drawings with architectural and civil dimensions, decking, railings, lighting, canopy cladding or plates, concrete foundations, anchor rods, and embedded items. Do not reproduce the Structural Drawings as shop drawings.

B. Connection Submittals:
   1. Use connection configurations, minimum bolt quantities, weld sizes, and connection capacities indicated on the Structural Drawings.
   2. Moment connections are detailed on the Structural Drawings and shall not be redesigned or substituted without written acceptance by the Structural Engineer of Record.
   3. Where a connection is not fully detailed or a standard connection cannot provide the capacity indicated on the Drawings, submit signed and sealed connection calculations and details prepared by the steel contractor's Illinois-licensed Professional Engineer.

C. Product Data: Submit data for heavy-hex high-strength bolt assemblies, anchor rods, welding consumables, nonshrink grout, hot-dip galvanizing, galvanizing-repair materials, duplex coating materials, and proprietary connection products.

D. Certificates and Reports:
   1. Certified mill test reports for structural steel and anchor rods.
   2. Manufacturer certificates for high-strength heavy-hex bolt, nut, and washer assemblies, including compliance of hot-dip galvanized matched assemblies.
   3. Welding procedure specifications, procedure qualification records where required, and current welder qualifications.
   4. Fabricator and erector quality-control procedures and inspection reports.
   5. Galvanizing certificates confirming compliance with ASTM A123/A123M and ASTM F2329/F2329M, as applicable.
   6. Galvanizing and coating coordination submittal identifying venting and drainage, distortion-control measures, surface preparation of galvanized steel, duplex coating sequence, slip-critical faying-surface treatment, field repair, and coating compatibility.

1.04 QUALITY ASSURANCE

A. Fabricator and Erector Qualifications: Firms experienced in fabrication and erection of structural steel framing of comparable size, geometry, exterior exposure, and Architecturally Exposed Structural Steel quality.

B. Welding Qualifications: Qualify welding procedures and personnel in accordance with AWS D1.1/D1.1M.

C. Galvanizer Qualifications: Firm experienced in hot-dip galvanizing structural steel and Category AESS 3 assemblies of comparable size and geometry, including control of venting, drainage, distortion, and finish quality.

D. Comply with AISC 303 and AISC 360-22 for fabrication, erection, and tolerances, except where more stringent requirements are indicated.

E. Preinstallation Conference: Before fabrication, coordinate structural steel geometry, connection detailing, Category AESS 3 requirements, vent and drain holes, hot-dip galvanizing, duplex coating, phased Work, erection sequence, and field-quality-control requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel with identification marks corresponding to approved shop drawings.

B. Store materials above ground on clean supports with drainage and ventilation. Protect from distortion, wet-storage staining, standing water, contamination, and damage to galvanizing or finish coating.

C. Handle Category AESS 3 and galvanized structural steel using padded slings and methods that prevent dents, gouges, scratches, staining, zinc-coating damage, and deformation.

D. Replace or repair damaged members only as accepted by the Structural Engineer of Record and Architect, as applicable.

PART 2 PRODUCTS

2.01 STRUCTURAL STEEL MATERIALS

A. W, C, MC, and WT Shapes: ASTM A992, minimum yield strength 50 ksi, unless otherwise indicated.

B. Angles, Plates, and Bars: ASTM A36, minimum yield strength 36 ksi, unless otherwise indicated.

C. Round Hollow Structural Sections: ASTM A500, Grade C.

D. Provide steel free of laminations, seams, cracks, excessive rust, and surface defects that impair strength, fit, coating performance, or AESS appearance.

2.02 BOLTS, ANCHOR RODS, AND ACCESSORIES

A. High-Strength Bolts: ASTM F3125, Grade A325 Type 1, heavy-hex; 3/4-inch minimum diameter unless otherwise indicated. Tension-control bolts are not permitted.

B. Provide compatible heavy-hex nuts and hardened washers as matched assemblies. Hot-dip galvanize complete bolt, nut, and washer assemblies in accordance with ASTM F2329/F2329M; provide overtapped and lubricated nuts as required for galvanized assemblies.

C. Anchor Rods: ASTM F1554, Grade 36, headed or threaded as indicated, with compatible nuts and washers. Provide sizes and embedment indicated on the Drawings and hot-dip galvanize anchor rods, nuts, and washers in accordance with ASTM F2329/F2329M. Stainless-steel anchor rods are not required unless specifically indicated.

D. Provide templates and setting devices required to maintain anchor-rod position and elevation during concrete placement.

E. Do not substitute post-installed anchors for cast-in anchor rods unless specifically accepted in writing by the Structural Engineer of Record.

2.03 WELDING MATERIALS

A. Electrodes and Filler Metals: AWS E70XX classification, low-hydrogen type, compatible with base metals and welding procedures.

B. Store and handle welding consumables in accordance with AWS D1.1/D1.1M and manufacturer requirements.

2.04 NONSHRINK GROUT

A. Factory-packaged, nonmetallic, nonshrink, hydraulic-cement grout complying with ASTM C1107 and suitable for exterior base-plate applications.

B. Provide minimum compressive strength compatible with the supporting concrete and not less than 5,000 psi at 28 days.

2.05 FABRICATION

A. Fabricate structural steel in accordance with AISC 303, AISC 360-22, approved shop drawings, and the Contract Drawings.

B. Fabricate members to profiles, geometry, slopes, cambers, and tolerances indicated. Verify curved, skewed, sloped, and radial canopy geometry before fabrication.

C. Perform shop fabrication and welding to the greatest extent practicable. Fit and assemble Work accurately to avoid field cutting and correction.

D. Do not enlarge holes by burning. Ream misaligned holes only with written acceptance.

E. Do not make unauthorized cuts, holes, copes, splices, or alterations. Repair or replacement procedures require written acceptance before implementation.

F. Connections:
   1. Provide shear-plate or double-clip-angle shear connections unless otherwise indicated. Single-angle connections are not permitted unless specifically shown.
   2. Provide not less than two bolts at each nonwelded side of a connection unless otherwise indicated.
   3. Provide shop connections that are high-strength heavy-hex bolted, slip-critical, or welded, and field connections that are high-strength heavy-hex bolted and slip-critical, except where field welding is specifically shown. Tension-control bolts are not permitted.
   4. Provide complete-joint-penetration butt welds and minimum 1/4-inch fillet welds unless another weld type or size is indicated.

G. Complete cutting, drilling, welding, and shop fabrication before hot-dip galvanizing. Remove burrs, sharp edges, weld spatter, and fabrication debris before galvanizing.

2.06 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

A. Provide Category AESS 3 for pavilion canopy structural steel exposed to view, including canopy columns, WT framing, round HSS perimeter members, plates, exposed connections, closure plates, and visible welds, as indicated on the Drawings and specified in Section 05 12 13.

B. Comply with AISC 303 Chapter 10 and Section 05 12 13 for Category AESS 3. Section 05 12 00 governs structural materials, connection design, bolt grades and joint types, weld size and strength, erection stability, and structural inspection.
   1. Fabricate exposed surfaces with consistent member orientation, alignment, joint spacing, and connection appearance.
   2. Provide smooth, uniform visible weld profiles free from undercut, overlap, porosity, arc strikes, spatter, irregular starts and stops, and other visually objectionable defects.
   3. Grind welds only as required to achieve the specified appearance or where flush welds are indicated; do not reduce weld size below that required.
   4. Remove exposed backing bars, runoff tabs, and temporary attachments where indicated or necessary for the required appearance; repair and blend affected surfaces.
   5. Orient exposed bolt heads consistently at similar connections. Locate erection aids and piece marks on concealed surfaces where practicable.
   6. Repair dents, gouges, rolled trade names, and surface irregularities that remain visible through the finish coating.

2.07 HOT-DIP GALVANIZING AND SHOP COATING

A. Hot-dip galvanize all structural steel, visible and concealed, including members, plates, stiffeners, connection material, base plates, and miscellaneous structural components after fabrication in accordance with ASTM A123/A123M. Hot-dip galvanize bolts, nuts, washers, and anchor rods in accordance with ASTM F2329/F2329M.

B. Provide vent and drain holes required for safe and complete galvanizing. Coordinate locations with the Structural Engineer of Record, Architect, fabricator, and galvanizer, and locate holes on concealed surfaces where practicable.

C. Control warpage and distortion during galvanizing in accordance with ASTM A384/A384M and coordinate fabrication sequence and member detailing with the galvanizer. Do not quench or apply post-galvanizing treatments that interfere with finish-coating adhesion.

D. Repair bare spots and damaged galvanizing in accordance with ASTM A780/A780M. Prepare galvanized surfaces for painting in accordance with ASTM D6386, Section 09 96 00, and coating-manufacturer requirements.

E. Provide the complete duplex coating system specified in Section 09 96 00. Apply shop coats to surfaces that will be inaccessible after assembly; a shop primer alone is not an acceptable substitute for the specified finish system.

F. At slip-critical connections, prepare hot-dip galvanized faying surfaces in accordance with the RCSC Specification for the required slip coefficient. Do not apply finish coating to faying surfaces unless the coating is qualified for the required slip coefficient.

G. Protect galvanized bolt and anchor-rod threads, field-weld areas, and surfaces receiving grout from finish-coating contamination and construction damage. Do not field-cut galvanized threads unless specifically accepted.

H. Where field welding is indicated, remove zinc and coating only as required for welding, protect adjacent surfaces, and repair galvanizing and finish coating after weld inspection.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify concrete supports, anchor rods, bearing elevations, dimensions, and embedded items before erection. Report discrepancies before proceeding.

B. Survey and document anchor-rod locations and bottom-of-base-plate elevations. Do not force members into position or alter base plates or anchor rods to accommodate errors.

C. Verify that galvanizing and shop-coating conditions are suitable for erection and that inaccessible surfaces are completely treated before assembly.

3.02 ERECTION

A. Erect structural steel in accordance with AISC 303, AISC 360-22, approved erection drawings, and the Contract Drawings.

B. Set members accurately to lines, elevations, slopes, and geometry indicated. Maintain required tolerances for Category AESS 3 Work.

C. Provide temporary bracing, guys, shoring, and supports required to maintain stability, alignment, and safety until the permanent structural system is complete.

D. Do not use thermal cutting for fitting-up AESS or other structural steel unless specifically accepted. Submit proposed field corrections before performing Work.

E. Do not cut, drill, weld, or otherwise modify erected steel to accommodate other trades without written acceptance by the Structural Engineer of Record.

F. Provide isolation only where stainless steel or another dissimilar metal contacts galvanized carbon steel, using isolation pads or washers indicated on the Drawings. Do not provide neoprene isolation washers between galvanized carbon-steel components.

3.03 BOLTED CONNECTIONS

A. Install heavy-hex high-strength bolted connections in accordance with the RCSC Specification and the connection type indicated on the Drawings. Tension-control bolts are not permitted.

B. Pretension slip-critical connections using an approved RCSC method suitable for hot-dip galvanized heavy-hex assemblies. Provide hardened washers and lubrication as required for the selected installation method.

C. Keep faying surfaces and areas adjacent to bolt heads and nuts free of oil, dirt, loose scale, unqualified finish coating, lacquer, overspray, and other materials that impair seating or slip resistance. Prepare galvanized faying surfaces as specified.

D. Remove burrs and defects that prevent solid seating. Do not reuse high-strength bolts.

E. At Category AESS 3 connections, orient bolt heads consistently and protect galvanized and finished surfaces during installation.

3.04 WELDED CONNECTIONS

A. Perform welding in accordance with AWS D1.1/D1.1M, AISC 360-22, approved welding procedures, and the Drawings.

B. Use qualified welders. Do not weld when environmental or base-metal conditions do not comply with AWS requirements.

C. Remove finish coating, zinc coating as required for welding, moisture, scale, oil, and other foreign material from surfaces to be welded and within the required weld-preparation area. Protect workers and adjacent Work during welding of galvanized steel.

D. Protect adjacent galvanized and finished surfaces during welding. Remove slag and spatter, clean welds, and repair galvanizing in accordance with ASTM A780/A780M after required inspection.

E. Repair visible welds and adjacent surfaces to satisfy Category AESS 3 requirements of Section 05 12 13 where exposed to view.

F. Do not perform repair welding without an accepted written repair procedure.

3.05 PHASED DECK AND CANOPY WORK

A. Provide permanent and temporary framing around canopy-column openings as indicated on the Drawings, including L6 x 3-1/2 x 1/2 angles and minimum connection requirements.

B. Coordinate temporary wood decking and opening covers with the Architectural Drawings. Maintain safe, secured openings throughout Phase 1.

C. Before Phase 2 canopy installation, remove only temporary framing and decking identified for removal. Protect permanent framing, coatings, and adjacent Work from damage.

D. Repair galvanizing and finish coating at removed attachments, field cuts, bolt holes, abrasions, and other damaged areas using ASTM A780/A780M and the specified duplex coating system.

E. Coordinate canopy column installation with existing deck framing, permanent opening angles, foundations, base plates, and architectural cover plates.

3.06 BASE PLATES AND GROUTING

A. Set base plates to elevations indicated using approved leveling devices. Do not use loose or stacked shims unless specifically accepted.

B. After steel is plumbed, aligned, and accepted for grouting, clean concrete and base-plate surfaces and place nonshrink grout to completely fill the space below base plates.

C. Place grout in accordance with the manufacturer instructions, protect from weather and vibration, and cure as recommended.

D. Do not load or disturb grouted base plates until grout has achieved the required strength.

3.07 FIELD QUALITY CONTROL

A. Special inspections of structural steel fabrication and erection, high-strength bolting, and welding will be performed in accordance with the Statement of Special Inspections and applicable IBC requirements.

B. Provide the Special Inspector safe access to Work, advance notice of fabrication and erection activities, approved shop drawings, mill certificates, bolt records, welding procedures, and welder qualifications.

C. Do not conceal connections before required inspection is complete.

D. Correct rejected Work and provide additional testing required to verify completed repairs at no additional cost to the Owner.

3.08 GALVANIZING AND COATING REPAIR

A. After erection and inspection, clean and repair field welds, cut edges, bolted connections, abrasions, bare spots, and damaged galvanizing in accordance with ASTM A780/A780M.

B. After galvanizing repair, prepare surfaces and apply primer and finish repair coats in accordance with ASTM D6386, Section 09 96 00, and coating-manufacturer requirements. Feather repairs to produce a continuous, uniform finish.

C. Complete coating of field-weld areas only after weld inspection and acceptance.

D. Repair visible Category AESS 3 surfaces so repaired areas are not visually objectionable and conform to the approved AESS mockup after finish coating.

3.09 CLEANING AND PROTECTION

A. Remove erection marks, temporary attachments, weld spatter, dirt, oil, and debris from completed structural steel.

B. Protect erected steel, Category AESS 3 surfaces, galvanizing, duplex coatings, anchor rods, and connections from damage by subsequent construction.

C. Replace or repair damaged structural steel and finishes before Substantial Completion.

END SECTION

051213
ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Category AESS 3 structural steel for the pavilion canopy exposed to view, including canopy columns, plates, exposed connections, closure plates, and visible welds, unless otherwise indicated on the Drawings.
2. Aesthetic fabrication, handling, erection, surface preparation, galvanizing, coating coordination, and repair requirements for AESS.

B. Related Requirements:
1. Section 05 12 00 - Structural Steel Framing, for structural materials, connection design, bolts, anchor rods, welding, fabrication, erection, and structural inspection requirements.
2. Section 07 56 00 - Cold Fluid-Applied Roofing, for surfaces of canopy roof plates receiving roofing materials.
3. Section 09 96 00 - High-Performance Coatings, for preparation and finish coating of galvanized AESS.

1.02 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

B. Category AESS 3: Structural steel designated as Category AESS 3 in accordance with ANSI/AISC 303, Section 10, and the Contract Documents.

C. SEAC/RMSCA Guide Specification: SEAC/RMSCA's "Sample Specification, Section 05 02 13: Architecturally Exposed Structural Steel."

1.03 COORDINATION

A. Coordinate surface preparation requirements for shop-primed items.

B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.04 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Village of Streamwood, 55 E. Irving Park Road.

1.05 ACTION SUBMITTALS

A. Product Data:
1. Exterior-grade metal filler compatible with hot-dip galvanizing and the specified coating system.
2. Galvanized-steel primer, etching or sweep-blast preparation materials, and finish-coating materials specified in Section 09 96 00.
3. Galvanizing repair materials complying with ASTM A780/A780M.

B. Sustainable Design Submittals:
1. Third-Party Certifications: For each product.
2. Third-Party Certified Life Cycle Assessment: For each product.

C. Shop Drawings: Show fabrication and erection of AESS. Structural steel Shop Drawings may be used when they include the following AESS information:
1. Identify each member, connection, weld, and surface designated as Category AESS 3 and identify transitions to non-AESS Work.

2. Show cuts, copes, connections, splices, holes, closure plates, cambers, curves, slopes, and other fabrication details affecting appearance.
3. Indicate orientation of mill marks, HSS seams, piece marks, and erection marks.
4. Indicate welds using AWS symbols, distinguishing shop and field welds, and show weld size, length, type, profile, required grinding, backing bars, runoff tabs, and temporary attachments.
5. Indicate high-strength bolt type, size, length, joint type, and orientation and location of bolt heads. Tension-control bolts are not permitted.
6. Indicate exposed surfaces and edges, surface preparation, hot-dip galvanizing, primer, finish coating, and field repair requirements.
7. Indicate vent and drain holes required for galvanizing, HSS weep holes, and methods for concealing or finishing holes exposed to view.
8. Indicate special fabrication and erection tolerances required for Category AESS 3.

D. Samples: Submit Samples to set quality standards for AESS.
1. Two steel plates, **3/8 by 8 by 4 inches**, with long edges joined by a groove weld and with weld ground smooth.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **Installer, fabricator, and shop-painting applicator**.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AESS similar to that indicated on this Project.

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, **Category ACSE**, and is experienced in erecting AESS similar to that indicated on this Project.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint **Endorsement P1** or SSPC-QP 3.

D. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.
1. Build mockup of typical portion of AESS **as shown on Drawings**.
2. Coordinate cold fluid applied roofing requirements with Section 075600 "Cold Fluid Applied Roofing."
3. Coordinate high-performance coatings requirements with Section 099600 "High-Performance Coatings."
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.
1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.09 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ANSI/AISC 303, Sections 1 through 9 and Section 10 requirements for Category AESS 3, except where more stringent requirements are indicated.

B. Completed AESS shall match the approved mockup for alignment, weld appearance, joint uniformity, surface finish, galvanizing, and coating appearance.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts: Comply with Section 05 12 00. Provide ASTM F3125/F3125M, Grade A325 Type 1, heavy-hex bolts with compatible heavy-hex nuts and hardened washers as matched assemblies. Tension-control bolts are not permitted.

B. Hot-dip galvanize high-strength bolt, nut, and washer assemblies in accordance with ASTM F2329/F2329M and the RCSC Specification. Provide nuts overtapped and lubricated as required for galvanized assemblies.

C. Anchor Rods: Comply with Section 05 12 00 and the Drawings. Hot-dip galvanize anchor rods, nuts, and washers. Stainless-steel anchor rods are not required unless specifically indicated.

D. Do not provide isolation washers between galvanized carbon-steel components. Where stainless steel contacts galvanized carbon steel, provide isolation pads or washers as indicated to prevent direct dissimilar-metal contact.

2.03 FILLER

A. Exterior-grade metal filler recommended by the filler and coating manufacturers for application to prepared galvanized structural steel and compatible with the complete coating system.

B. Do not use filler to replace required weld metal, conceal unacceptable welding, or repair structural defects.

2.04 PRIMER

A. Steel Primer:
1. Comply with Section 099600 "High-Performance Coatings."

B. Galvanized-Steel Primer: .
1. Comply with Section 099600 "High-Performance Coatings."
2. Etching Cleaner: MPI#25, for galvanized steel.
3. Galvanizing Repair Paint: **ASTM A780/A780M**.

2.05 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.

D. Category AESS 3:
1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with **3/8-inch** closure plates.
6. Limit butt and plug weld projections to **1/16 inch**.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.

8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.
17. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
18. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
19. Orient HSS seams as indicated or away from view.
20. Align and match abutting member cross sections.
21. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of **1/8 inch**. At closed joints, maintain uniform contact within **1/16 inch**.
22. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.

F. Erection marks, painted marks, and other marks are permitted on **galvanized-resisting (weathering)** steel surfaces of completed structure.

G. Cleaning Corrosion-Resisting (Weathering) AESS: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6 (WAB)/NACE WAB-3.

2.06 SHOP CONNECTIONS

A. High-Strength Bolts: Install in accordance with Section 05 12 00 and the RCSC Specification for the joint type indicated. Orient bolt heads consistently at similar exposed connections.

B. Weld Connections: Comply with AWS D1.1/D1.1M and Section 05 12 00 for welding procedures, weld quality, structural requirements, and correction of welding Work.

2.07 GALVANIZING

A. Hot-Dip Galvanizing: Comply with ASTM A123/A123M for fabricated structural steel and ASTM F2329/F2329M for threaded fasteners.

B. Galvanizing Repair Material: Comply with ASTM A780/A780M and be compatible with the specified finish coating.

C. Hot-dip galvanize all AESS after fabrication and before finish coating in accordance with ASTM A123/A123M.

D. Do not quench or apply post-galvanizing treatments that interfere with coating adhesion.

E. Remove zinc spikes, runs, drips, roughness, and other projections visible in the completed Work without reducing required zinc coating thickness below acceptable limits.

F. Repair bare spots and damaged galvanizing in accordance with ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments, showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.03 ERECTION

A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
2. Grind tack welds smooth.
3. Remove backing and runoff tabs, and grind welds smooth.
4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
7. Conceal fabrication and erection markings from view in the completed structure.

B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.
2. Erection of Category AESS 3:
a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
c. Remove weld spatter, slivers, and similar surface discontinuities.
d. Grind off butt and plug weld projections larger than **1/16 inch**.
e. Continuous welds are to be of uniform size and profile.
f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
g. Splice members only where indicated on Drawings.
h. No torch cutting or field fabrication is permitted.
i. Weld profiles, quality, and finish are be as approved by Architect.
j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install in accordance with Section 05 12 00 and the RCSC Specification for the joint type indicated. Tension-control bolts are not permitted.

B. Weld Connections: Comply with AWS D1.1/D1.1M and Section 05 12 00. Protect adjacent galvanized and coated surfaces, and repair galvanizing and coating after inspection.

3.05 REPAIR

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:
1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting, to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Cleaning and touchup painting are specified in Section 099600 "High-Performance Coatings."

C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

3.06 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform structural steel inspections specified in Section 05 12 00 and the Statement of Special Inspections. The testing agency is not responsible for aesthetic acceptance.

B. Architect will observe installed AESS for conformance with the approved mockup and aesthetic requirements.

C. Structural Engineer of Record will review structural adequacy and code compliance only and is not responsible for aesthetic acceptance.

3.07 CLEANING AND PROTECTION

A. Remove dirt, oil, stains, erection marks, weld spatter, and debris from completed AESS using methods approved by the galvanizer and coating manufacturer.

B. Protect completed AESS and coating from damage by subsequent construction. Repair damage before Substantial Completion.

END SECTION

SECTION 055213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Guardrails.

1.02 REFERENCE STANDARDS

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2020.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

C. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).

D. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025, with Amendment (2026).

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's seal and signature on each sheet of shop drawings.

C. Delegated Design Submittal: Submit structural design calculations for guardrail assemblies, mounting plates, post-installed anchors, and connections, signed and sealed by the qualified structural engineer responsible for their preparation.

D. Welders' Qualification Statement: Welders' certificates in accordance with AWS D1.1/D1.1M and dated within the previous 12 months.

1.04 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Fabricator Qualifications:
   1. A company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Removable Guardrail: Provide removable guardrail at future pedestrian bridge location. Guardrail shall remain in place at completion of this Contract until removal is authorized as part of future pedestrian bridge construction. Design attachment to facilitate future removal of guardrail without removal or demolition of the concrete sidewalk.

B. Design and fabricate railing assemblies in accordance with applicable codes.

C. Distributed Loads: Design railing assembly and attachments to resist distributed force of 50 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set.

D. Concentrated Loads: Design railing assembly and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set.

E. Allow for expansion and contraction of members without damage to connections or members.

F. Dimensions: See drawings for configurations and heights.
   1. Top Rails: 1-1/2 inches nominal diameter Schedule 40 steel pipe.
   2. Intermediate Rails: 1-1/2 inches nominal diameter Schedule 40 steel pipe.
   3. Posts: 1-1/2 inches nominal diameter Schedule 40 steel pipe.
   4. Guard height: 42 inches minimum above sidewalk.
   5. Arrange horizontal rails so openings comply with applicable code requirements

G. Provide anchors, fasteners, mounting plates, and other components required to attach railings to concrete sidewalk face on drop side, where drop is over 35" to grade. Provide post-installed anchors suitable for exterior exposure and sized, spaced, and embedded as indicated on approved engineered Shop Drawings.

2.02 STEEL RAILING SYSTEM

A. Steel Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.

B. Welding Fittings: Factory- or shop-welded from matching pipe; seams continuously welded; joints and seams ground smooth.

C. Galvanizing: In accordance with requirements of ASTM A123/A123M.

2.03 FABRICATION

A. Accurately form components to suit specific Project conditions and for proper connection to concrete sidewalk.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Provide vent and drain holes required for hot dip galvanizing and drainage, located to minimize visibility and water intrusion.
   2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
   3. Perform welding in accordance with AWS D1.1/D1.1M.

E. Weld connections that cannot be shop welded due to size limitations.
   1. Weld in accordance with AWS D1.1/D1.1M.
   2. Match shop welding and bolting.
   3. Clean welds, bolted connections, and abraded areas.
   4. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with approved Shop Drawings and post-installed anchor manufacturer's written instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Face mount guardrail posts to exposed vertical face of concrete sidewalk using welded mounting plates and post-installed anchors indicated on approved engineered Shop Drawings.
   1. Locate reinforcing steel prior to drilling. Do not cut or damage reinforcing steel. Coordinate anchor locations with approved engineered Shop Drawings.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 055213

057300
DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Steel and iron decorative railings.

1.02 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible.

B. Coordinate installation of anchorages for railings. 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 items to Project site in time for installation.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Architect
   2. General Contractor
   3. Construction Manager (if applicable)
   4. Owner’s Representative
   5. Metal railing fabricator and installer
   6. Subcontractors with coordinating work

1.04 ACTION SUBMITTALS

A. Product Data:
   1. Manufacturer's product lines of decorative metal railings assembled from standard components.
   2. Illuminated rails.
   3. Fasteners.
   4. Post-installed anchors.
   5. Shop primer.
   6. Intermediate coats and topcoats.
   7. Bituminous paint.
   8. Nonshrink, nonmetallic grout.
   9. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.
   1. For illuminated railings, include wiring diagrams and roughing-in details.

C. Samples for Initial Selection: For products involving selection of color, texture, or design**,** including mechanical finishes.

D. Samples for Verification: For each type of exposed finish required.
   1. Sections of each distinctly different linear railing member, including top rails, posts, and balusters
   2. Illuminated railing.
   3. Fittings, end caps, and brackets.
   4. Welded connections.
   5. Assembled Sample of railing system, made from full-size components, including illuminated top rail, post, , and guard infill. Sample need not be full height.
      a. Show method of connecting and finishing members at intersections.

E. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For delegated design professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

E. Research Reports: For post-installed anchors, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

F. Preconstruction test reports.

1.06 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
   3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
   1. Build mockups as shown on Drawings.
   2. Build mockups for each form and finish of railing, consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 48 inches in length.
   3. Subject to compliance with requirements, approved mockups may not become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.08 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Top Rails of Guards:
      a. Uniform load of **50 lbf/ft.** applied in any direction.
      b. Concentrated load of **200 lbf** applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of **50 lbf** applied horizontally on an area of **1 sq. ft.**
      b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
   1. Temperature Change: **120 deg F**, ambient; **180 deg F**, material surfaces.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.06 STEEL AND IRON DECORATIVE RAILINGS

A. Steel and Iron Decorative Railings:
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. **Streetlife – Basis of Design: Bowie Bridges**
      b. Maglin Site Furniture
      c. Landscape Forms Studio 431
      d. Or approved equal.
   2. Source Limitations: Obtain steel decorative railing components from single source from single manufacturer.

B. Tubing: **ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5**.

C. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

D. Plates, Shapes, and Bars: ASTM A36/A36M.

E. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

F. Illuminated Top Rails: Provide internal illumination using concealed, internally wired, integrated LED lamps to illuminate walking surfaces adjacent to railings without light leaks. Make provisions for servicing and for concealed connection to electric service.
   1. LED Luminaires: Comply with Electrical Light Fixture Schedule. **FASTENERS**

A. Fastener Materials:
   5. Ungalvanized-Steel Railing Components: Plated-steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for electrodeposited zinc coating where concealed; Type 304 stainless steel fasteners where exposed.
   6. Hot-Dip Galvanized-Steel Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
   7. Dissimilar Metal Railing Components: **Type 304** stainless steel fasteners.
   8. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.
   1. Provide **tamper-resistant** flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 **or ICC-ES AC308**.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy **Group 1** stainless steel bolts, ASTM F593 and nuts, ASTM F594.

2.08 MISCELLANEOUS MATERIALS

B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

E. Etching Cleaner for Galvanized Metal: Compatible with coating system specified.

F. Galvanizing Repair Paint: High-zinc-dust-content paint compatible with coating system specified.

G. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

H. Epoxy Zinc-Rich Primer: Compatible with topcoat.

I. Shop Primer for Galvanized Steel: **Cementitious galvanized metal primer**.

J. Intermediate Coats and Topcoats: Provide products that comply with Section 099600 "High-Performance Coatings."

N. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

O. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   1. Water-Resistant Product: **At exterior locations**, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.09 FABRICATION

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage**, but not less than that required to support structural loads**.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
   1. Clearly mark units for reassembly and coordinated installation.
   2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.
   1. Remove burrs and ease edges to a radius of approximately **1/32 inch** unless otherwise indicated.
   2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water.
   1. Provide weep holes where water may accumulate.
   2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with **welded** connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove flux immediately.
   4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

K. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
   1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
   2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

L. Form changes in direction as follows:
   1. As detailed.

M. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

N. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

P. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.

Q. Provide inserts and other anchorage devices for connecting railings to concrete or masonry Work.
   1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
   2. Coordinate anchorage devices with supporting structure.

R. For railing posts set in concrete, provide stainless steel sleeves not less than **6 inches** long with inside dimensions not less than **1/2 inch** greater than outside dimensions of post, with metal plate forming bottom closure.

X. Toe Boards: Where indicated on Drawings, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.14 STEEL AND IRON FINISHES

A. Galvanized Railings:
   1. Hot-dip galvanize **exterior** steel and iron railings, including hardware, after fabrication.
   3. Comply with ASTM A123/A123M for hot-dip galvanized railings.
   4. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
   5. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
   6. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
   2. Do not apply primer to galvanized surfaces.

J. Powder-Coat Finish for Galvanized Metal: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
   1. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
   2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.

3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness of not less than **1.5 mils**.
4. Color: **Match Architect's sample**.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.
1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of **1/16 inch in 3 feet**.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed **1/4 inch in 12 feet**.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.02 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending **2 inches** beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within **6 inches** of post.

3.03 ANCHORING POSTS

A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with **nonshrink, nonmetallic grout**, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than **5 inches** deep and **3/4 inch** larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with **nonshrink, nonmetallic grout**, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Cover anchorage joint with flange of same metal as post, **welded to post after placing anchoring material**.

D. Leave anchorage joint exposed with **1/8-inch buildup, sloped away from post**.

E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
4. For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.

3.04 ATTACHING RAILINGS

A. Anchor railing ends to concrete and masonry with **sleeves concealed within or flanges connected to or brackets on underside of rails connected to** railing ends and anchored to wall construction with anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and **welded to railing ends**.

3.05 REPAIR

A. Touchup Painting:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
      a. Apply by brush or spray to provide a minimum **2.0-mil** dry film thickness.
   2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."

3.06 CLEANING

C. Clean **rails** by wiping with a damp cloth and then wiping dry.

D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

3.07 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END SECTION

061533
PLASTIC DECKING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Plastic decking.

1.02 DEFINITIONS

A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater in width.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

1.03 ACTION SUBMITTALS

A. Product Data: For plastic decking and metal framing anchors.
   1. For plastic decking and metal framing anchors. Include installation instructions.

B. Samples: For plastic decking, three (3) boards not less than 12 inches long, showing the range of variation to be expected in appearance of decking, including surface texture.

1.04 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Expansion anchors.
   2. Metal framing anchors.
   3. Decking fasteners.

1.05 QUALITY ASSURANCE

A. Manufacturer/Vendor Qualifications: Products covered under this Section shall be supplied by a single manufacturer/vendor unless otherwise specified with a minimum of three years proven production or supply experience.

B. Installer Qualifications: Installer shall have a minimum of three years proven construction experience and be capable of estimating and building from drawings and details, determining elevations, in addition to proper material handling.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 PRODUCTS

2.01 PLASTIC DECKING

A. Plastic Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
   1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, are not to be less than design loads and spans indicated.

B. Composite Plastic Lumber: Shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Basis of Design: Streetlife® Decking Systems, Bridges & Decking | Streetlife
      b. CertainTeed; SAINT-GOBAIN
      c. Fiberon
      d. Green Bay Decking, LLC

e. Midwest Manufacturing
f. MoistureShield; Oldcastle APG, Inc., CRH Americas, Inc.
g. NewTechWood America, Inc.
h. TimberTech, AZEK Building Products; The AZEK Company LLC
i. Trex Company, Inc.
j. UFP Construction; a UFP Industries Company
k. Or approved equal.

2. Decking Standard: ICC-ES AC109.
3. Decking Size: 2-3/4-inch (7 cm) x 2-3/4-inch (7 cm) actual thickness radius-edged.
4. Configuration: Provide product with grooved edges or other configuration designed for fastening with concealed decking fasteners.
5. Surface Texture: Manufacturer's standard.
6. Color: Cloudy Grey and Black

2.02 FASTENERS

A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into substrate.
   1. Use stainless steel fasteners unless otherwise indicated.

B. Power-Driven Fasteners: ICC-ES AC70.

C. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.

D. Carbon-Steel Bolts: ASTM A307 with ASTM A563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.

E. Stainless Steel Bolts: ASTM F593, Alloy Group 1 or 2; with ASTM F594, Alloy Group 1 or 2 hex nuts and, where indicated, flat washers.

F. Post-installed Anchors: Stainless steel, chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing in accordance with ASTM E488 conducted by a qualified independent testing and inspecting agency.
   1. Stainless steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.03 CONCEALED DECKING FASTENERS

A. Deck Splines: Corrosion-resistant metal or plastic splines that fit in grooves routed into the sides of decking material and are fastened to deck framing with screws. Splines provide uniform spacing of decking material.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Grabber Construction Products, Inc.
      b. Ipe Clip Fastener Company Inc. (The)
      c. M. M. Products, Inc.
      d. Titan Metal Werks, Inc.
      e. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.03 INSTALLATION, GENERAL

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.

D. Install plastic lumber to comply with manufacturer's written instructions.

E. Secure decking to framing with deck splines.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

G. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. ICC-ES AC70 for power-driven fasteners.
   2. "Fastening Schedule" in ICC's International Building Code.

H. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.04 PROTECTION

A. Protect all finished work in place until Final Completion of the project.

END SECTION

075600
COLD FLUID APPLIED ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cold Fluid Applied Roofing and Waterproofing.

1.02 RELATED SECTIONS

A. Section 051213 - Architecturally Exposed Structural Steel

B. Section 099600 - High-Performance Coatings

1.03 REFERENCES

A. ASTM D 570 - Standard Test Method for Water Absorption of Plastics

B. ASTM D 2240 - Standard Test Method for Rubber Property-Durometer Hardness

C. SSPC - Steel Structures Painting Council painting standards.

D. CRRC (Cool Roof Rating Council) - Standard 1

E. FM - Approvals Guide

F. FM Loss Prevention Bulletin 1-49

G. SMACNA - Architectural Sheet Metal Manual

1.04 PERFORMANCE

A. System assembly shall comply with FM / UL testing data showing that the system meets the local wind uplift requirements and provides a Class A fire-rated roof assembly.

B. System assembly shall be listed on the CRRC website coolroofs.org showing that the initial solar reflectance, thermal emittance, and SRI values comply with LEED requirements, local building code requirements, and any specific project requirements.

1.05 SUBMITTALS

A. Submit under provisions of Section 013000 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Product Literature.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.
   5. Safety Data Sheets (SDS) for all components.

C. Shop Drawings: Show including plans and details of cold fluid-applied polymethyl methacrylate liquid resin membrane system including membrane, penetration flashings, base flashings, and expansion joints size, flashing details, and attachment.

D. Verification Samples: For each product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, thickness, color, texture and surfacing.

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

F. Field Quality Control: Submit the following.
   1. Daily inspection and testing reports
   2. Substrate and Bond Testing Reports

3. Completed Membrane Inspection Reports

G. Closeout Submittals: Submit roofing manufacturer and applicator's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing reinforced liquid resin roofing membranes with a minimum of 20 years of documented experience with applications in the United States.

B. Installer Qualifications: Company specializing in performing the work of this section with a minimum of 3 years documented experience and approved by system manufacturer for warranted membrane installation.

C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress

D. Manufacturer's Field Service: Membrane manufacturer shall provide the services of a competent field representative on-site to provide the following inspections:
   1. Job start inspection at the beginning of each phase of the project, to review special detailing conditions and substrate preparation.
   2. Periodic in-progress inspections throughout duration of the project to evaluate membrane and flashing application.
   3. Observe field quality control testing.
   4. Final punch-list inspection at the completion of each phase of the project prior to installation of any surfacing or overburden materials.
   5. Warranty inspection to confirm completion of all punch list items, surfacing, and overburden application.

E. Source Limitations: Obtain all principal components of roofing system from a single manufacturer. Secondary products that are required shall be as recommended and approved in writing by the roofing system manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the manufacturer.

F. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Prepare and clean a 3-foot (0.9 m) by 3-foot (0.9 m) area of each substrate material type anticipated and located in areas designated by Architect.
   2. Test each area to verify that substrate preparation meets specified requirements. Tests shall include tensile bond strength of substrate.
   3. Do not proceed with the work until test results and workmanship are approved by Architect.
   4. Rework mock-up area as required to produce acceptable work.
   5. Maintain mock-up for quality control during the progress of the remaining work.

G. Field Quality Control Flood Test: Conduct a flood test of the completed membrane and flashing system. Test shall be of a 24-hour minimum duration and shall apply a water head of 2 inches over the entire application area. Any incidents of water entry shall be evaluated and all necessary repairs conducted, followed by an additional flood test until all repairs are completed successfully.

1.07 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of substrate construction to receive roofing, installers of work in and around roofing which must precede or follow roofing work including mechanical and electrical penetration, equipment openings, subsequent finish work, and the Architect, Owner, and roofing system manufacturer's representative.

C. Objectives include:
   1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
   2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, penetrations and other preparatory work.
   3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
   4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
   5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   6. Review required inspection, testing, certifying procedures.
   7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
   8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store materials off the ground or on pallets, under cover and in a cool, dry location, out of direct sunlight, in accordance with manufacturer's recommendations. Store roll goods horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. Do not use rolls that are wet, dirty or have damaged ends. Materials must be kept dry at all times. Plastic wrapping installed at the factory should not be used as outside storage covers.

C. Do not store materials in quantities that exceed design loads, damage substrate materials, hinder installation or drainage.

D. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified. Fleece reinforcing materials must be clean, dry and free of all contaminants.

E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of the local authorities having jurisdiction.

F. Maintain copies of all current SDS for all components on site. Provide personnel with appropriate safety data information and training as it relates to the specific chemical compounds to be utilized.

1.09 SEQUENCING

A. Apply roofing in a timely manner in conjunction with work of other trades. Coordinate with other trades to avoid traffic over or against completed membrane surfaces.

B. Coordinate with installation of drains as shown on Drawings, including flashing, and associated roofing work.

C. Field Quality Control:
   1. On-Site Substrate Testing of substrates shall be successfully completed prior to installation of roofing membrane.
   2. Field Quality Control Tests of completed sections of waterproofing membrane shall be successfully completed before proceeding with protection layers and overburden. Schedule tests promptly to allow timely installation of protection layers.

1.10 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not apply roofing membrane during or with the threat of inclement weather.

C. Application of roofing membrane may proceed while air temperature is between 23 degrees F (minus 5 degrees C) and 95 degrees F (40 degrees C) and providing the substrate is a minimum of 5 degrees F above the dew point.

D. When ambient temperatures are at or expected to fall below 70 degrees F (21 degrees C), or reach 85 degrees F (30 degrees C) or higher, follow Membrane System Manufacturer's recommendations for weather related application procedures.

E. Ensure that substrate materials are dry and free of contaminants. Do not commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials.

F. Where required by the Architect, implement odor control and elimination measures prior to and during the application of the roofing materials. Control/elimination measures shall be field tested at off-hours and typically consists of 1 or a multiple of the following measures:
   1. Sealing of air intakes with activated carbon filters. Install filters in accordance with requirements and recommendations of the filter manufacturer. Seal filters at joints and against building exterior walls to prevent leakage of unfiltered air.
   2. Sealing of doorways, windows, and skylights with duct tape and polyethylene sheeting to prevent leakage of air into the building.
   3. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station. Enclosure shall be field constructed or pre-manufactured of fire-retardant materials in compliance with local requirements in accordance with requirements of the Owner or his designated Representative. Provide enclosure(s) with mechanical air intake/ exhaust openings and Odor Control Air Cleaners, as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Exhaust opening shall be sealed with activated carbon filter
   4. Protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.

1.11 WARRANTY

A. Manufacturer's Material Warranty: Provide 20-year manufacturer's material only warranty for supply of membrane only, limited to amounts necessary to effect repairs necessitated solely by material defective in content and composition.

B. Manufacturer's Select Labor and Material Warranty: Provide 2-year manufacturer's select warranty that provides for cost of labor and materials required to address loss of

watertightness, limited to amounts necessary to affect repairs necessitated by defective material, with total expenditure limited to the original cost of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Kemper System America, Inc., which is located at: 1200 North America Drive, West Seneca, NY 14224. Toll Free Tel: 800-541-5455 - Fax: 716-558-2978. Email: request info (inquiry@kempersystem.com); Web: https://www.kemper-system.com/us/eng

B. Requests for substitutions will be considered in accordance with provisions of Section 016000 - Product Requirements.

2.02 PRODUCTS, GENERAL

A. Materials shall be products of a single manufacturer or items standard with manufacturer of membrane roofing system. Provide secondary materials that are produced or are specifically recommended by manufacturer of membrane roofing system to ensure compatibility.

B. Monolithic Membrane: Kemper System America's monolithic membrane is created in the field by combining the KEMPEROL AC SPEED FR two-part, cold liquid-applied Polymethyl Methacrylate resin with Kemperol polyester reinforcing fleece. Kemperol polyester reinforcing fleece is a 360-degree needle punched non-woven 120 g/m2 polyester reinforcing fleece, for a finished dry film membrane thickness of 0.090-inch nominal per ply. Membrane shall have the following properties:

1. Physical Properties: All times are approximate and depend upon air flow, humidity and temperature:
    a. Color: Light Gray / Bright White
    b. Physical State: Cures to Solid
    c. Bright White Resin Solar Reflectance (initial) CRRC Rated 0.86, ASTM C 1549
    d. Bright White Resin Thermal Emittance (initial) CRRC Rated 0.88, ASTM C 1371
    e. Bright White Resin SRI (initial) 108, ASTM E 1980
    f. Thickness (120 Fleece): 90 mils
    g. VOC Content: 32 g/L
    h. Peak Load @ break 70 lbf, ASTM D 5147
    i. Elongation: Min 30 percent ASTM D 5147
    j. Tearing Strength: 80 lbf ASTM D 5147
    k. Dimensional stability: 0.05 percent ASTM D 5147
    l. Water Absorption: 0.05 percent ASTM D 570
    m. Impact Resistance: Shore A: 75 plus or minus 5 ASTM D 2240
    n. Crack spanning: 0.08 inch (2 mm)
    o. Usage time: 20 minutes
    p. Rainproof after: 35 minutes
    q. Solid to walk on after: 35 minutes
    r. Apply surfacing/overburden after: 60 minutes
    s. Completely hardened: 6 hours
    t. Short-term temperature resistance: 482 degrees F (250 degrees C)

C. Membrane Flashings: Composite of the same resin material as field membrane with 120 g/m2 fleece reinforcement.

D. Substrate Primer and Resin Additives:
   1. PMMA Primer; Kempertec AC primer two-component, quick-curing reactive cure methyl methacrylate resin for use in improving adhesion of membrane to wood, metal, and cementitious/masonry substrate surfaces.
   2. Additive: Kemperol CP Catalyst Powder is a reactive agent used to induce setting of Polymethal Mytha-crylate (PMMA) products. The amount of Catalyst Powder must be adjusted according to the ambient temperature, reference individual manufacturer's technical data sheets.

E. Surfacings And Coatings:
   1. Color Coating: Kemperdur AC Finish; Two-component methyl methacrylate-based coating suitable for use as a colored coating.

2.03 ACCESSORIES

A. Solvent-Based Cleaner for Tools and Membrane Tie-Ins: Methyl Ethyl Ketone (MEK) or acetone.

B. Citrus-Based Cleaner for Membrane: Kempertec Klean.

C. Water-Based Cleaner for Membrane: Simple Green HD.

D. Backer Rod: Expanded, closed-cell polyethylene foam designed for use with cold-applied joint sealant.

E. Joint Sealant:
   1. Multipurpose Sealant: GreatSeal PE-150, a single component, polyether, multi-purpose sealant for use above the roofing membrane, doors and windows, masonry, siding, concrete, and more. Can be applied on a damp surface and in cold weather. Bonds aggressively to wood, Modified Bitumen, asphalt, EPDM, PVC & PIB, vinyl, fiberglass, glass, painted, galvanized and anodized metals and Kynar finish.

F. Expansion Joints in Excess of 2 Inches: Provide flat, vulcanized waterproofing joint integral with the waterproofing membrane to accommodate movements over 2 inches (50 mm) and capable of 500 percent elongation at minus 40 degrees F (minus 40 degrees C) across its length and at all vulcanized points.
   1. Product: Joint material SITURA INC. RedLINE.
   2. Connections: All connections factory fabricated by vulcanization.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared and conditions are suitable to proceed with the Work of this specification.
   1. Substrates shall be inspected and repaired as needed to provide a proper surface to receive roofing system.
   2. Verify substrate surface slopes to drain for horizontal roofing applications.
   3. Identify incompatible or unsatisfactory substrates, if any.

B. Verify substrate openings, curbs, and protrusions through deck/substrate, wood cant strips and reglets are in place and solidly set.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. General: Surfaces to be prepared as a substrate for the new roofing system as follows:
   1. Determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new roofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing.
   2. Prepare flashing substrates as required for application of new roofing membrane flashings.
   3. Inspect substrates, and correct defects before application of new roofing. Fill all surface voids greater than 1/8 inch wide with an acceptable fill material.
   4. Remove all ponded water, snow, frost and/or ice from the work substrate prior to installing new roofing materials.
   5. Substrate for roofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, roofing agents, curing compounds, and free of projections which could damage membrane materials.

B. On-Site Substrate Testing: Perform tests at the beginning of the Work, and at intervals as required to assure specified substrate conditions with a minimum of 3 tests per 5000 SF area to be waterproofed. Smaller areas shall receive a minimum of 3 tests. Submit test results to the Architect promptly as they are completed. Notify the Architect immediately in the event the test results are below specified values. Do not begin application of waterproofing until acceptable conditions are achieved.
   1. Substrate Bond Strength:
      a. Evaluate bond strength by means of Elcometer Adhesion Tester Model 106 or similar device, or by the performance of a manual pull test.
      b. Tensile bond strength of membrane to substrate must be greater than or equal to 150 psi (1.0 N/mm2).
      c. Adequate surface preparation will be indicated by 135-degree peel bond strength of membrane to substrate such that cohesive failure of substrate or membrane occurs before adhesive failure of membrane/ substrate interface.
      d. In the event the bond strengths are less than the minimum specified, additional substrate preparation and testing is required. Repeat testing to verify suitability of substrate preparation.
      e. Where results exceed the maximum acceptable reading contact Membrane Manufacturer for recommendations.

C. Steel/Metal:
   1. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3, Power Tool Cleaning, or as required by Roofing Manufacturer. Extend preparation a minimum of 1 inch beyond the termination of the membrane flashing materials.
   2. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A wire brush finish is not acceptable.

D. Other Flashing Surfaces:
   1. Remove all contaminants as required by membrane manufacturer. Surface preparation shall be performed by means approved by Architect and Roofing Manufacturer.

3.03 PRIMER APPLICATION

A. General:

1. Mix and apply two-component primer in strict accordance with written instructions of Membrane Manufacturer.
2. Substrate surface must be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth wipe or a combination of methods.
3. Do not apply primer on any substrate containing asphalt, coal-tar pitch, creosote or penta-based materials unless approved in writing by Membrane Manufacturer. Some substrates may require additional preparation before applying primer.

B. Mixing of Kempertec AC Primer:
1. Premix primer Component A thoroughly with a spiral agitator.
2. Determine the correct amount of catalyst Component B based upon ambient temperature in accordance with written instructions of Membrane Manufacturer.
3. Add primer catalyst Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed without creating any bubbles or streaks.
4. Do not aerate. Primer solution should be a uniform color, with no light or dark streaks present.

C. Application:
1. After mixing, apply the primer with a roller or brush evenly onto the surface in a cross directional method, or utilizing the pour and spread method to fully cover the substrate.
2. Porous and higher moisture content concrete substrates may require an adjustment to the primer application rate or multiple coats to achieve proper pore saturation.
3. Exposure of the primer in excess of 48 hours or premature exposure to moisture may require removal and reapplication of primer. DO NOT apply new primer over primer prematurely exposed to moisture, or primer used as temporary roofing, unless approved in writing by the Membrane Manufacturer.

3.04 MEMBRANE APPLICATION

A. General:
1. Apply the roofing membrane immediately following full curing of the primer in order to obtain the best bond between primer and membrane.
2. Mix and apply cold fluid-applied reinforced polymethyl methacrylate roofing membrane in strict accordance with written instructions of Membrane Manufacturer.
3. Primed substrate surface shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.
4. Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before 6 hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.
5. Follow the Membrane Manufacturer's recommendation for hot and cold weather application. Monitor surface and ambient temperatures, including the effects of wind chill.

B. Mixing of Kemperol AC Speed FR Resin:
1. Premix resin Component A thoroughly with a spiral agitator.

2. Determine the correct amount of catalyst Component B based upon ambient temperature in accordance with written instructions of Membrane Manufacturer.
3. Add resin catalyst Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed without creating any bubbles or streaks. Do not aerate. Resin solution should be a uniform color, with no light or dark streaks present.

C. Application of Resin/Fleece:
1. After the Resin is mixed, using a Kemperol roller nap or brush, apply 2/3 of the resin liberally and evenly onto the surface. Covering one working area at a time, between 10 - 15 sq.ft.
2. Roll the Kemperol Fleece directly into the Resin, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding folds and wrinkles. The fleece will begin to rapidly saturate with the liquid resin mix. Use the roller or brush to work the resin into the fleece, saturating from the bottom up, and eliminating air bubbles, wrinkles, etc. It is important to correct these faults before the resin cures.
3. Apply the remaining 1/3 of the resin to the top of fleece to complete the saturation. Rolling the final coat of resin onto the fleece should result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated portion of the fleece. The correct amount of resin will completely saturate the fleece and no white color will be visible. Work wet membrane to avoid any blisters, openings, or lifting at corners, junctions, and transitions. Always assure full resin saturation of fleece.
4. Prevent contact between mixed/unmixed resin and new/existing membrane. If any unmixed resin contacts membrane surface remove immediately and clean thoroughly with a cloth rag.
5. At all fleece seams, allow a 2-inch (5 cm) overlap for all side joints and a 4-inch (10 cm) overlap for all end joints.
6. At membrane tie-offs, clean in-place membrane with MEK when resin has cured. Allow solvents to fully evaporate before application of new resin. DO NOT APPLY PRIMER TO EXISTING KEMPEROL MEMBRANE.

3.05 FLASHING APPLICATION

A. General:
1. Install flashing system in accordance with the requirements/recommendations of the Membrane manufacturer and as indicated on the manufacturer's standard drawings. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system.
2. Wherever possible, install the flashings before installing the field membrane to minimize foot traffic over newly installed field membrane.
3. All membrane flashings shall be installed concurrently with the roofing membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Membrane manufacturer. Should any water penetrate the new roofing membrane because of incomplete flashings, the affected area shall be removed and replaced at the Contractor's expense.
4. Provide a minimum vertical height of 8 inches for all flashing terminations. Flashing height shall be at least as high as the potential water level that could be reached as a result of a deluging rain and/or poor slope. Do not flash over existing through-wall flashings, weep holes and overflow scuppers.
5. All flashings shall be terminated as required by the Membrane Manufacturer.

B. Metal Flashing - General:

1. Metal flashings shall be fabricated in accordance with the current recommendations of SMACNA and in accordance with the Manufacturer's standard drawings.
2. Metal flashing flanges to which membrane is to be bonded shall be a minimum of 4 inches in width and secured to the substrate or wood nailers 6 inches on center staggered with fasteners appropriate to the substrate type. Flanges shall be provided with a roughened surface that has been cleaned of all oil and other residue.
3. Metal edges that will be overlaid with membrane shall be provided with a 1/4-inch minimum hemmed edge.
4. Apply primer, resin and fleece to metal flange, extending membrane to outside face of metal edging, and to vertical face of metal base/curb flashing.

C. Membrane Flashing - General:
1. Membrane flashings shall be fabricated with primer appropriate for the substrate surface, resin of the same base chemical type as the field membrane, and fleece of the same weight as the field membrane unless specified otherwise.
2. Primer, resin, and fleece mixing and application methods as specified for field membranes are also suitable for membrane flashing.
3. Fleece shall overlap 2 inches (5 cm) minimum for all joints. Fleece shall be cut neatly to fit all flashing conditions without a buildup of multiple fleece layers. Work wet membrane with a brush or roller to eliminate blisters, openings, or lifting at corners, junctions, and transitions.

D. Pipes, Conduits, and Unusually Shaped Penetrations:
1. Flashing is typically constructed as a two-part assembly consisting of a vertical wrap and a horizontal target patch. Provide a minimum of a 2-inch (5 cm) overlap between vertical and horizontal flashing components.

E. Drains and Scuppers:
1. Acceptable drain and scupper materials are galvanized, galvalum, cast iron, cast aluminum, copper, hard PVC, and ABS.
2. Flashing material shall extend 4 inches minimum onto drain or scupper flange and into drain/ scupper body.
3. Install clamping ring if provided as part of the drain or scupper design. Install a strainer basket to prevent debris from clogging the drainage line.

F. Flexible Penetrations:
1. Provide a weathertight gooseneck of round cross-section for each penetration or group of penetrations. Set in water cut-off mastic and secure to the structural substrate.
2. Flashing is typically constructed as a two-part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a 2-inch (5 cm) overlap between vertical and horizontal flashing components.

G. Walls, Curbs and Base Flashings:
1. Wall, curb and base flashings shall be installed to solid substrate surfaces only. Adhering to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding, and other similar materials is not acceptable.
2. Reinforce all transition locations and other potential wear areas with a 4-inch-wide membrane strip evenly positioned over the transition prior to installing the exposed flashing layer.

3. Reinforce all inside and outside corners with a 4-inch diameter conical piece of membrane prior to installing the exposed flashing layer.
4. All pins, dowels and other fixation elements shall be flashed separately with a vertical flashing component prior to installing the exposed flashing layer.
5. Extend flashing a minimum of 4 inches onto the field substrate surface.

H. Drip Edges and Gravel Stops:
1. Metal drip edges and gravel stops shall be installed to solid substrate surfaces or wood nailers only. Securement to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding or coping, and other similar materials is not acceptable.
2. Flash all drip edges and gravel stops by extending the field membrane all the way to the edge of the exposed face prior to installing the metal edging. Strip in the metal flange with a separate 8-inch-wide strip of membrane adhered to both the securement flange and to the field membrane.
3. For conditions where water infiltration behind the exposed drip edge or gravel stop face is possible, install a separate membrane layer positioned behind the face area and extending a minimum of 4 inches past the securement flange onto the field substrate prior to installing the drip edge or gravel stop.

I. Field Fabricated Control or Expansion Joint Flashing:
1. Control or expansion joints in excess of 2 inches in width and all expansion joints subject to vehicular traffic require the use of a separate engineered joint system.
2. For non-vehicular expansion joints in excess of 2 inches apply a minimum 8-inch strip of Kemperol membrane onto the primed field substrate on both sides of the joint. Lay expansion joint into the liquid membrane while wet. Following the initial embedment, cover the top fleece surface of the expansion joint material with a second 13-inch strip of Kemperol membrane, overlapping the fleece portion of the expansion joint, the first layer of Kemperol membrane and terminating on the field substrate.
3. For expansion joints that are less than 2 inches grind or otherwise bevel the inside edges of the joint opening to provide a smooth transition edge for the fleece.
4. Flashing typically consists of a fully saturated membrane bottom layer looped into the joint as a cradle, a compressible foam or rubber insert at 25 percent compression fitted into the joint, and a membrane top layer applied over the joint. Extend both fleece layers 4 inches minimum onto the field substrate on both sides of the joint.
5. Apply the field membrane tying into the entire joint area.

J. Electrical Conduit, Gas Lines and Lightning Protection
1. Supports for electrical conduit and gas lines greater than 1 inch in diameter require the use of a separate engineered support system.
2. Supports for electrical conduit and gas lines 1 inch or less in diameter, and bases for lightning protection rods and cable, can be adhered directly to the membrane surface with a single-component, polyurethane construction adhesive.

3.06 MEMBRANE PREPARATION FOR SURFACINGS AND COATINGS

A. Membrane must be clean and dry, and free of all contaminants that may interfere with the adhesion of the surfacing and coating to the membrane surface.

B. Membrane exposed less than 48 hours prior to application of surfacing and coating materials does not require special surface preparation. It is highly recommended that all surfacing and coating materials be applied to the membrane surface within 48 hours.

C. Membrane exposed longer than 48 hours will require sanding/scuffing of the surface to remove the hard gloss finish, followed by an MEK or acetone solvent wipe.

3.07 SURFACING AND FINISHES

A. Coating-Type Finish Surfacing
   1. Where specified, provide and install Membrane Manufacturer's approved methyl methacrylate-based coating applied over clean, fully cured membrane at the manufacturer's recommended application rate.
   2. Pre-mix coatings prior to application to achieve an even consistency and color. Mix thoroughly for approximately 2 minutes with a clean spiral agitator without creating any bubbles or streaks. Do not aerate.
   3. Apply coating at the manufacturer's recommended application rate. Two coating applications are recommended for best coverage and appearance. After completion of coating, avoid any foot traffic for a minimum of 6 hours to allow for surfacing to cure.

B. Adhesion Key:
   1. Where placement of cementitious or non-cementitious materials is required over sections of the roofing membrane or flashing, apply manufacturer's methyl methacrylate primer/coating at the manufacturer's recommended coverage rate, with broadcast to excess of kiln-dried silica sand into wet primer/coating.

3.08 TEMPORARY CLOSURES AND WATERSTOPS

A. Ensure that moisture does not damage any completed section of the new roofing system. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition. All temporary closures shall be made as recommended or required by the membrane manufacturer.

3.09 PROTECTION

A. Upon completion of roofing and flashings and associated work, institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. Protect all areas where membrane has been installed

3.10 FIELD QUALITY CONTROL

A. Flood Test of the completed membrane and flashing system shall be conducted prior to the installation of any overburden/surfacing. Flood test shall be of a 24-hour minimum duration, and shall apply a 2-inch water head of over the entire application area. Any incidents of water entry shall be evaluated and all necessary repairs conducted, followed by an additional flood test.

B. Prepare a written report of results of successful and unsuccessful inspection testing and submit to Architect within 7 days following each test. Report shall include date of test, project name, list of products being applied and tested, name of applicator, name of Contractor, and conditions causing failure of roofing in event of an unsuccessful test.

C. Complete all post installation procedures in accordance with the manufacturer's guidelines for warranty issuance of the specified warrantee.

D. Notification of Completion: Notify the membrane manufacturer of job completion and schedule a final inspection date.

E. Final Inspection: At the completion of the Work meet with the membrane manufacturer's technical field representative to evaluate the completed installation of the field and flashing membrane. Complete all previously noted punch list items prior to the scheduled meeting.

F. Correction of Work: Work that does not conform to specified requirements including tolerances, slopes, and finishes shall be corrected and/or replaced. Any deficiencies of membrane application, termination and/or protection as noted during the Membrane Manufacturer's inspections shall be corrected and/or replaced.

3.11 CLEANING

A. Clean-Up: Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be restored to preconstruction condition.

B. Roofing materials, components and accessories shall be removed from Site and taken to a legal dumping area authorized to receive such materials.

C. Disposal of Primer and Resin: Cured resin may be disposed of in standard landfills. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation

3.12 PROTECTION

A. Protect building components with tarps or other suitable materials, from soil, stains, or spills at all hoisting points and areas of application.

B. Any such damage shall be repaired at Contractor's expense to Owner's satisfaction or be restored to original condition.

C. Provide barricades, retaining ropes, safety elements and any appropriate signage required.

D. Protect finished roofing membrane from damage by other trades by the use of a cushioning layer such as 1-inch thick expanded polystyrene insulation and an impact layer such as 1/2-inch-thick exterior-grade plywood.

E. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the membrane unless approved by manufacturer's chemical resistance chart.

F. Eliminate construction traffic on newly tested membrane systems. Do not store construction materials on unprotected membrane surfaces.

G. Membrane areas that are observed to be trafficked or used as a storage/working platform shall be retested and immediately repaired and covered with insulation and drainage composite.

END SECTION

099600
HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:
   1. Exterior Substrates.
      a. Galvanized metal.

B. Related Requirements:
   1. Section 051213 "Architecturally Exposed Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.
   2. Section 057300 "Decorative Metal Railings" for shop priming pipe and tube railings with coatings specified in this Section.

1.02 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
   2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
   1. Submit Samples on rigid backing, **8 inches** square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.04 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Coatings: **5** percent, but not less than **1 gal.** of each material and color applied.

1.05 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
      a. Wall and Ceiling Surfaces: Provide samples of at least **100 sq. ft.**
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F**.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.07 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between **50 and 95 deg F**.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than **5 deg F** above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 PRODUCTS

2.01 HIGH-PERFORMANCE COATINGS, GENERAL

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Behr Paint Company (Behr Process LLC)
   2. Benjamin Moore & Co.
   3. Carboline Company; a subsidiary of RPM International
   4. Coronado Paint; Benjamin Moore & Co.
   5. Corotech Coatings; Benjamin Moore & Co.
   6. Diamond Vogel Paint Company
   7. H&C Decorative Concrete Products; a brand of Sherwin-Williams Co.
   8. Hempel (USA), Inc.
   9. International Protective Coatings; AkzoNobel
   10. PPG Paints; PPG Industries, Inc.
   11. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
   12. Sherwin-Williams Company (The)
   13. **Tnemec Company, Inc. Endura-Shield II (Basis of Design)**

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

C. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

D. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
   3. Products shall be of same manufacturer for each coat in a coating system.

E. Colors: Match Architect's samples .

2.02 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.03 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
   1. Contractor shall touch up and restore coated surfaces damaged by testing.
   2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.05 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.06 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Galvanized-Metal Substrates:
   1. Pigmented Polyurethane over Epoxy Primer System **MPI EXT 5.3L**:
      a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, **MPI #101**.
         1) Tnemec, Series 66 Hi-Build Epoxoline II or Series 135 Chembuild (high-solids epoxy).
      b. Intermediate Coat: Polyurethane, two-component, pigmented, gloss matching topcoat.
      c. Topcoat: Polyurethane, two-component, pigmented, gloss (MPI Gloss Level 6), **MPI #72**.
         1) Tnemec, Series 1074 / 1075 Endura-Shield II.

END SECTION

SECTION 101400
MONUMENT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior monument sign dimensional lettering and mounting components.

B. B. Layout templates, concealed anchors, fasteners, isolation materials, and accessories required for a complete installation.

C. Coordination with cast-in-place concrete monument sign wall, structural footing, grading, and adjacent landscape Work.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Quality assurance requirements.

C. Section 016000 - Product Requirements: Product options and substitution procedures.

D. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, and closeout requirements.

E. Section 033000 - Cast-in-Place Concrete: Concrete monument sign wall and footing.

F. Structural Drawings: Monument sign footing and reinforcing.

G. Drawings: Sign dimensions, copy, lettering size, location, and mounting relationship.

1.03 REFERENCE STANDARDS

A. ASTM B221/B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Permits: Obtain sign permits and approvals required by authorities having jurisdiction.

B. Verify approved sign copy, spelling, typeface, letter height, spacing, and placement before fabrication.

C. Coordinate fabrication and mounting requirements with construction of the concrete monument sign wall. Furnish templates and embedded items before concrete placement when required by the approved mounting system.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer data for dimensional letters, coating system, fasteners, anchors, and installation materials.

C. Shop Drawings:
   1. Sign elevation showing exact copy, typeface, letter size, spacing, alignment, and relationship to monument sign edges.
   2. Letter profiles, return depth, mounting studs, anchors, spacers, and attachment to concrete.
   3. Full-size paper or electronic mounting template with control dimensions.
   4. Coordination requirements for embedded anchors, if proposed.

D. Samples:
   1. One full-size sample letter or a minimum 8 by 8 inch sample showing aluminum profile, exposed edges, coating color, sheen, and attachment method.

2. Manufacturer standard black powder-coat finish samples when more than one black or sheen is available.

E. Qualification Data: Fabricator and installer experience.

F. Warranty: Sample written warranty.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm specializing in exterior dimensional letter signage with not less than five years of documented experience.

B. Installer Qualifications: Firm experienced in installation of dimensional metal letters on cast-in-place concrete substrates and approved by the fabricator.

C. Single-Source Responsibility: Obtain letters, mounting templates, anchors, and exposed accessories from one fabricator.

1.07 FIELD CONDITIONS

A. Field verify dimensions and condition of the completed concrete monument sign before final fabrication or drilling.

B. Do not install letters until concrete has cured not less than 28 days and moisture conditions are suitable for the mounting system.

C. Do not install during precipitation, freezing weather, or when substrate conditions prevent secure attachment.

1.08 WARRANTY

A. Provide a five-year written warranty covering failure of letter attachment, excessive fading, chalking, peeling, blistering, corrosion, and delamination of the powder-coated finish.

B. Repair or replace defective Work and restore adjacent concrete or landscape Work damaged by corrective operations at no additional cost to Owner.

PART 2 PRODUCTS

2.01 DIMENSIONAL LETTERING

A. Sign Copy: VILLAGE OF STREAMWOOD, as indicated on the Drawings.

B. Letter Height: 8 inches.

C. Letter Construction: Extruded or fabricated aluminum dimensional letters with closed faces and returns, suitable for permanent exterior exposure.

D. Return Depth: 1 inch minimum, unless a greater depth is required for structural rigidity or indicated on approved Shop Drawings.

E. Typeface and Proportions: Match the Drawings. Submit exact typeface and letter spacing for approval before fabrication.

F. Finish: Exterior-grade polyester powder coating, black, low-gloss or satin sheen, uniformly applied to exposed faces, returns, and edges.

G. Fabrication: Provide letters with crisp corners, smooth faces, straight returns, and no visible seams, weld marks, distortion, oil-canning, or fasteners.

H. Internal Illumination: None.

2.02 MOUNTING COMPONENTS

A. Mounting: Concealed stud mounting. Through-fastened exposed screws are not permitted.

B. Studs and Anchors: Type 304 or Type 316 stainless steel, aluminum, or other noncorrosive material compatible with aluminum letters and concrete substrate.

C. Adhesive: Exterior-grade, nonstaining adhesive compatible with letter finish and concrete, used only as supplemental attachment unless specifically approved as the primary attachment method.

D. Isolation Materials: Nonstaining sleeves, washers, or sealants required to prevent galvanic action and moisture intrusion at penetrations.

E. Templates: Full-size, rigid or paper templates accurately locating each letter and mounting penetration.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify concrete monument sign dimensions, finish, alignment, and structural condition before installation.

B. Verify that lettering will fit within the limits indicated and will not conflict with joints, reinforcing, embedded items, or concealed utilities.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 LAYOUT

A. Establish horizontal and vertical control lines from the completed monument sign, not from adjacent grades.

B. Position lettering using approved full-size templates. Maintain uniform baseline, cap height, spacing, and distance from monument sign edges.

C. Obtain Landscape Architect review of taped or temporarily positioned template before drilling mounting holes.

3.03 INSTALLATION

A. A. Install dimensional letters in accordance with approved Shop Drawings and fabricator written instructions.

B. Drill accurately sized holes without spalling or cracking concrete. Remove drilling dust and debris before inserting anchors.

C. Set letters straight, level, plumb, and securely anchored. Provide consistent stand-off from the concrete face when stand-offs are indicated or approved.

D. Seal penetrations with nonstaining exterior sealant where required to prevent water entry.

E. Replace letters that are scratched, dented, bent, misaligned, or otherwise damaged.

3.04 CLEANING AND PROTECTION

A. Clean letters and adjacent concrete using methods recommended by the fabricator. Do not use abrasives or cleaners that alter the coating or concrete finish.

B. Remove templates, labels, adhesive residue, and installation debris.

C. Protect completed signage from damage until Final Completion.

END OF SECTION 101400

SECTION 131213
FLOATING POND FOUNTAIN AND AERATOR

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SECTION INCLUDES

A. Packaged floating pond fountain and aerator, including motor unit, float, intake screens, interchangeable nozzles, mooring system, underwater power cable, controls, and accessories.

B. Color-changing submersible LED lighting system, including fixtures, brackets, underwater cable, controller, and remote control.

C. Concrete anchors, mooring lines, secondary weights, hardware, and cord protection required for a complete installation.

D. Assembly, installation, startup, testing, adjustment, demonstration, seasonal removal, storage, and reinstallation.

1.03 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Quality assurance and testing requirements.

C. Section 016000 - Product Requirements: General product and substitution requirements.

D. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, demonstration, and closeout requirements.

E. Division 26 - Electrical: Branch circuit, disconnecting means, conduit, conductors, grounding, control-panel mounting, power pedestal or handhole, and electrical connections.

F. Drawings: Fountain location, pond elevations, power location, and installation detail.

1.04 DEFINITIONS

A. Floating Pond Fountain and Aerator: A packaged, floating, electrically powered unit that circulates pond water and creates an above-water decorative display.

B. Normal Water Elevation: The normal pond water-surface elevation indicated on the Drawings.

C. Operating Season: The period during which the fountain is installed in the pond and available for operation, generally after risk of damaging ice has passed and before seasonal freezing.

1.05 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; edition adopted by the authority having jurisdiction.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. Comply with applicable federal, State of Illinois, and local electrical, environmental, and safety requirements.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Fountain motor, float, screens, nozzles, power cable, controls, lighting, mooring lines, and accessories.
   2. Electrical characteristics, minimum operating water depth, operating amperage, control-panel requirements, cable limitations, and available cord lengths.
   3. Spray-pattern dimensions for each furnished nozzle.
   4. Manufacturer's installation, operation, seasonal removal, storage, and maintenance instructions.

C. Shop Drawings: Show fountain location, mooring and anchoring arrangement, anchor locations and weights, mooring-line routing, secondary weights, power-cable routing, control-panel location, cable lengths, and coordination with the electrical Work.

D. Cord-Length Verification: Submit field measurement from fountain location to control panel and identify the factory power-cord length proposed. Spliced underwater power cords are not acceptable.

E. Electrical Coordination Data: Submit manufacturer's wiring diagrams, control-panel installation requirements, overcurrent-protection requirements, grounding requirements, and required incoming service conductors for coordination with Division 26.

F. Qualification Data: Submit qualifications for Installer and authorized equipment supplier or service provider.

G. Startup Report: Record nozzle installed, water depth, voltage, operating amperage, timer settings, lighting operation, control functions, and corrective adjustments.

H. Operation and Maintenance Data: Include complete instructions, parts lists, winterization procedures, recommended inspection intervals, troubleshooting information, and contact information for local service.

I. Warranty Documentation: Submit manufacturer and Installer warranties.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer regularly engaged in production of packaged floating pond fountains and aerators with at least five years of documented experience.

B. Installer Qualifications: Installer experienced with equipment of the type and size specified and authorized or approved by the manufacturer.

C. Electrical Work: Performed by a licensed electrician in accordance with Division 26 and requirements of authorities having jurisdiction.

D. Listing: Complete fountain package and control equipment shall be listed and labeled by a nationally recognized testing laboratory for the intended use.

1.08 COORDINATION

A. Coordinate equipment selection and power-cord length with final fountain location and the power pedestal, handhole, control panel, and branch circuit indicated in Division 26.

B. Coordinate mooring and anchor locations with pond grading, pond liner or geotextiles, underground utilities, aquatic planting, fountain spray limits, and maintenance access.

C. Coordinate initial fountain operation with establishment of aquatic and wetland planting. Do not operate the fountain when currents, spray, or wave action may dislodge or damage new planting.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in original, unopened packaging with labels intact.

B. Protect motor, float, nozzles, lighting fixtures, controls, cables, and accessories from impact, moisture intrusion, corrosion, ultraviolet exposure, contamination, and theft.

C. Do not lift or handle the fountain by the power cable or light cable.

D. Store motor unit, controls, and lighting equipment in a secure, dry location in accordance with manufacturer's instructions.

1.10 FIELD CONDITIONS

A. A. Do not install or operate equipment until pond grading, water level, electrical service, and safe maintenance access are complete.

B. Verify water depth at the fountain location at the lowest anticipated operating water elevation is not less than the manufacturer's minimum requirement.

C. Do not enter the water or permit others to enter the water while fountain or lighting equipment is energized.

D. Do not operate fountain during construction activities that may introduce sediment, debris, concrete washout, chemicals, or other contaminants into the pond.

1.11 WARRANTY

A. Fountain Equipment: Manufacturer's standard warranty, but not less than five years for the 5 hp fountain motor unit.

B. Lighting Equipment: Manufacturer's standard warranty, but not less than two years.

C. Installer Warranty: One year from Date of Substantial Completion for installation, mooring, anchoring, electrical terminations performed under this Section, adjustment, and workmanship.

D. Repair or replace defective equipment and correct installation deficiencies at no additional cost to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Manufacturer: Kasco Marine, Inc.; J Series Fountain.

B. Basis-of-Design Product: Model 5.1JF, 5 hp, 208-240 V, single phase, 60 Hz, with C-95 control panel, five interchangeable nozzles, and compatible color-changing LED lighting package.

C. Substitutions: See Section 016000 - Product Requirements. Proposed substitutions shall provide equal or greater hydraulic performance, visual display options, electrical safety, warranty, serviceability, and compatibility with the electrical and pond conditions indicated.

2.02 PACKAGED FLOATING FOUNTAIN AND AERATOR

A. Type: Floating, submersible-motor decorative fountain and aerator, complete package designed for permanent seasonal installation in an exterior pond.

B. Motor: 5 hp, oil-cooled submersible motor, 208-240 V, single phase, 60 Hz, nominal 20 running amperes.

C. Minimum Operating Water Depth: Not more than 26 inches.

D. Construction: Corrosion-resistant assembly with marine-grade stainless-steel motor housing and structural components suitable for continuous submersion in fresh water.

E. Float: Manufacturer's one-piece or sectional float sized for the motor unit and lighting system, with mounting hardware and protective intake screens.

F. Screens: Corrosion-resistant top and bottom screens arranged to reduce intake of debris while permitting required flow.

G. Nozzles: Provide the manufacturer's five standard interchangeable nozzles furnished with the basis-of-design package. Nozzles shall be removable without special tools and shall produce distinct decorative patterns.

H. Final Nozzle Selection: Demonstrate each supplied nozzle pattern. Owner will select the nozzle to remain installed at completion.

I. Performance: Operate continuously without excessive vibration, cavitation, oil leakage, abnormal noise, overheating, or tripping of protective devices.

2.03 FOUNTAIN CONTROL PANEL

A. Basis-of-Design: Kasco C-95 control panel or control panel furnished as part of an approved complete fountain package.

B. Electrical Service: 208-240 V, single phase, 60 Hz, four-wire incoming service consisting of L1, L2, neutral, and equipment grounding conductor, as required by manufacturer.

C. Enclosure: Lockable, nonmetallic, rainproof enclosure suitable for exterior installation; NEMA 3R or 4X.

D. Provide human-rated ground-fault protection, integral surge protection, terminal blocks, and manufacturer-required branch-circuit protection.

E. Controls: Separate 24-hour timers for fountain and lighting operation. Provide manual override and clearly labeled controls.

F. Mounting: Coordinate support, pedestal, mounting height, clearances, and feeder connection with Division 26.

2.04 COLOR-CHANGING LED LIGHTING SYSTEM

A. Provide fountain-manufacturer-approved submersible RGB or RGBW LED lighting package sized to evenly illuminate the selected 5 hp fountain display.

B. Fixtures: Not fewer than six corrosion-resistant, watertight fixtures unless the manufacturer recommends and documents an alternate quantity that provides equal illumination.

C. Provide mounting clips or brackets, underwater-rated power cable, required transformers or power supplies, lighting control panel, connectors, and accessories.

D. Controls: Remote color selection, fixed-color operation, color sequencing, brightness adjustment, and on-off control.

E. Remote Control: Provide one handheld remote with operating range suitable for control from the adjacent shore and control-panel location.

F. Lighting cable length shall be coordinated with fountain power-cord length and the control-panel location. Underwater splices are not permitted except factory-installed, listed, watertight quick-disconnect assemblies.

2.05 UNDERWATER POWER CABLE AND CORD PROTECTION

A. Provide factory-furnished, underwater-rated flexible power cable of one continuous length from fountain motor to control panel or manufacturer-approved connection point.

B. Cable length shall be selected from manufacturer's standard lengths based on verified field dimensions and shall include sufficient slack for installation, water-level variation, retrieval, and maintenance without tension on connections.

C. Provide manufacturer-recommended cable gauge for selected length and electrical load.

D. Provide strain relief, abrasion protection, protective sleeving, and cord weights or anchors required to keep cords submerged, protected, and clear of public access, maintenance equipment, mooring lines, and aquatic planting.

E. Do not use the power cable as a mooring line, retrieval line, or lifting cable.

2.06 MOORING AND ANCHORING MATERIALS

A. Mooring Lines: Manufacturer-furnished or manufacturer-approved ultraviolet-resistant rope sized for fountain weight, wind, wave action, ice-free operating conditions, and anticipated water-level variation.

B. Anchors: Precast concrete anchor blocks or other noncorrosive deadweight anchors sized and arranged in accordance with manufacturer's written requirements and the approved Shop Drawings.

C. Hardware: Stainless-steel shackles, thimbles, clips, and connectors suitable for continuous exterior freshwater exposure.

D. Secondary Weights: Concrete or corrosion-resistant weights attached to mooring lines where required to keep lines below the water surface and outside areas accessible to the public.

E. Retrieval Lines: Provide separate retrieval lines where required for safe seasonal removal and maintenance.

2.07 MAINTENANCE MATERIALS

A. Provide all furnished interchangeable nozzles, nozzle hardware, remote controls, keys, special tools, and unused accessories to Owner at Substantial Completion.

B. Provide one spare remote-control battery set and one spare set of control-panel keys.

C. Label and store accessories in weather-resistant containers identifying Project, equipment model, and contents.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify fountain location, pond grades, normal and high-water elevations, minimum water depth, power location, and access are consistent with the Drawings and manufacturer's requirements.

B. Verify electrical rough-in, control-panel support, conduit, conductors, grounding, and disconnecting means are complete and ready for connection.

C. Verify pond is free of construction debris, submerged hazards, excessive sediment, and conditions that may clog or damage equipment.

D. Notify Landscape Architect of unsuitable conditions. Do not proceed until conditions are corrected or written direction is received.

3.02 PREPARATION

A. Review approved Shop Drawings and manufacturer's instructions with installers before assembly.

B. Field measure required power-cord and lighting-cord lengths before ordering equipment.

C. Protect pond liner, geotextiles, aquatic and wetland planting, shoreline stabilization, paving, and completed Work during access and installation.

D. Provide safe lifting, launching, retrieval, and shore-access methods appropriate for equipment weight and site conditions.

3.03 ASSEMBLY AND INSTALLATION

A. Assemble motor unit, float, screens, nozzle, lighting fixtures, and accessories in accordance with manufacturer's written instructions.

B. Do not modify factory equipment, cords, control panels, or listed assemblies without written manufacturer approval.

C. Install fountain at the location indicated and orient display to provide the intended appearance and clearances from shore, structures, trees, lighting, and overhead obstructions.

D. Maintain manufacturer-required submergence and operating depth at the lowest anticipated operating water elevation.

E. Route and secure power and lighting cables to prevent tension, abrasion, entanglement, tripping hazards, damage by maintenance operations, and interference with the fountain display.

3.04 MOORING AND ANCHORING

A. Install a minimum two-point mooring system or the arrangement required by the manufacturer and approved Shop Drawings.

B. Set anchor blocks on stable pond-bottom areas without damaging liner, geotextiles, utilities, or planting shelves. Do not drag anchors across completed pond surfaces.

C. Adjust mooring lines to maintain fountain location while allowing movement caused by normal wind, wave action, and water-level fluctuation.

D. Install secondary weights so mooring lines remain below the normal water surface and do not create a hazard to the public or maintenance personnel.

E. Do not attach mooring lines to trees, utilities, site furnishings, electrical equipment, or other Work unless specifically indicated.

3.05 ELECTRICAL CONNECTIONS

A. Electrical connections shall comply with Division 26, manufacturer's wiring diagrams, NFPA 70, and authorities having jurisdiction.

B. Install and connect control panel, fountain power cable, lighting system, timers, ground-fault protection, surge protection, grounding, and disconnecting means.

C. Provide watertight strain relief and listed fittings at control-panel entries. Maintain enclosure rating.

D. Do not energize fountain or lighting until equipment is installed in water at required operating depth and installation is ready for testing.

3.06 FIELD QUALITY CONTROL AND STARTUP

A. Manufacturer's authorized representative or qualified Installer shall inspect installation and supervise startup.

B. Test ground-fault protection, timers, controls, remote control, lights, surge protection, and disconnecting means.

C. Operate fountain under load and record line voltage and operating amperage. Verify readings are within manufacturer's published limits.

D. Operate each furnished nozzle pattern and verify stable, uniform display without excessive vibration, surging, abnormal noise, cavitation, or spray onto walks, electrical equipment, or other areas not intended to receive water.

E. Operate lighting through available colors, sequences, brightness levels, and timer functions.

F. Verify mooring and anchoring maintain fountain position and that cords and lines remain protected and submerged as intended.

G. Correct deficiencies and repeat tests until equipment is operating properly. Submit completed Startup Report.

3.07 DEMONSTRATION AND TRAINING

A. Provide not less than two hours of on-site training for Owner personnel.

B. Demonstrate startup, shutdown, timer adjustment, lighting controls, nozzle changes, inspection, cleaning, retrieval, seasonal removal, storage, spring reinstallation, ground-fault testing, and basic troubleshooting.

C. Review safety requirements, including prohibition against entering the water while equipment is energized.

D. Provide written record identifying personnel trained and date of training.

3.08 PROTECTION AND ADJUSTMENT

A. Protect equipment, cords, control panels, and mooring system from damage through Substantial Completion.

B. Adjust timers and operating schedule as directed by Owner.

C. Coordinate fountain startup and operating schedule to avoid erosion, scour, sediment suspension, or damage to newly installed aquatic and wetland plants.

D. Replace damaged or defective components before acceptance.

3.09 SEASONAL REMOVAL, STORAGE, AND REINSTALLATION

A. Provide one fall removal and one spring reinstallation during the warranty period at no additional cost to Owner.

B. Before freezing conditions, disconnect power, retrieve the fountain and lighting system, clean equipment, inspect cords and components, and deliver equipment to an Owner-designated storage location.

C. Store equipment out of direct sunlight in a cool, dry location maintained above 32 degrees Fahrenheit. Position motor unit in accordance with manufacturer's instructions to maintain seal lubrication.

D. Leave underwater cables in place only when specifically permitted by the manufacturer and fitted with listed watertight protective caps. Otherwise remove and store cables with the unit.

E. In spring, inspect, reinstall, reconnect, test, and place equipment into operation after ice and unsafe conditions have cleared and water depth is adequate.

3.10 CLOSEOUT

A. Provide accepted Startup Report, Operation and Maintenance Data, warranty documentation, serial numbers, nozzle set, remotes, keys, special tools, and maintenance materials before requesting Substantial Completion.

B. Label control panels, breakers, disconnects, power cords, lighting cords, and stored accessories with equipment identification.

C. Provide record drawing identifying final fountain location, anchor locations, cord routing, control-panel location, cable lengths, and concealed connections.

D. Clean control equipment, fountain, lights, access areas, and adjacent Work. Remove installation debris from pond and site.

END OF SECTION 131213

260500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Electrical equipment coordination and installation.
   2. Sleeves for raceways and cables.
   3. Sleeve seals.
   4. Grout.
   5. Common electrical installation requirements.

1.03 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Product Data: For sleeve seals.

1.05 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
   1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

D. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
   1. Coordinate installation and connection to exterior underground and overhead utilities and services, including provision for electricity-metering components.
   2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

E. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

1.06 SHOP DRAWINGS

A. In addition to the preparation and submittal for Shop Drawings for manufactured electrical equipment and materials, prepare and maintain in current status, a complete set of detailed, completely circuited, and dimensioned electrical construction drawings for all electrical work

included under the Contract. These drawings shall be made at the Contractor's expense and may be made on background copy tracings of the Engineer's drawings.

B. Installation drawings shall be made under the direction and supervision of the Contractor and shall show all electrical work inclusive of conduit, wiring, electrical equipment and devices and elevations, points where conduit enters or leaves structural slabs and walls, junction boxes, conduit supports and inserts. The complete electrical distribution system from source or sources up to and including each branch circuit panelboard shall be shown and dimensioned exactly as installed, with all feeders located on plan. Major equipment and apparatus shall be shown to scale and properly located. Drawings shall also show exact locations and depths of underground conduits and ducts and their terminations, as installed.

C. The drawings shall include floor plan and electrical layouts drawn at a scale (or scales) as required under SHOP DRAWINGS. It is intended that construction drawings of each trade be the same scale(s) in order to permit respective plans to be superimposed upon all others of each trade.

D. In addition to the floor plans, the layouts of all congested areas such as mechanical and/or electrical equipment rooms, and all functionally critical areas shall be drawn at a minimum scale of ¼" equal 1'-0", or with all details of construction shown. The Engineer may request additional drawings if in his opinion they are required to properly coordinate the project.

E. All drawings shall be made in AUTOCAD 2010 of the same size and with the same border lines and title blocks as the Engineer's drawings, with the Contractor's name added.

F. The Contractor shall be responsible for the coordination of electrical work with the work of all other trades and shall, in preparing the installation drawings, check the work of other trades and shall, in preparing the installation drawings, check the work of other trades (inclusive of that indicated by shop drawings) in order to avoid possible installation conflicts arising therefrom. It shall be understood that the work shown on the construction drawings has been so coordinated. In the event of conflicts or interfaces that cannot be resolved in the field, the Contractor shall request a written clarification from the Engineer.

G. The drawings shall indicate the electrical installation exactly as constructed and therefore shall be periodically revised to reflect all changes inclusive of those required by the Engineer, those which are or have been found necessary in the field, those which may be suggested by the Engineer etc.

H. Initial copy of all drawings with sign off from the General, Mechanical, Plumbing and Fire Protection Contractors, shall be submitted to the Engineer for his review. These submittals shall not be considered as shop drawings and are not subject to approval unless so requested. It shall be clearly understood that these construction drawings are for installation coordination purposes only and cannot in any way alter the requirements of the Contract. Therefore, the Contract Drawings, Specifications, and authorized revisions thereto, shall remain the only determinants of contract requirements.

I. Upon completion, the initial drawings, and all revised drawings thereafter, shall be dated and certified by the Contractor as having been fully coordinated by him. It shall then be understood that the work shown thereupon is ready for construction.

J. No electrical work shall begin until these drawings (and each revision thereof) are so drawn, and thereafter finally accepted by the Owner.

K. All drawings shall be made in accordance with an approved schedule, prepared by the Contractor, and arranged coincide with actual construction in such a manner as to allow the latter to proceed without delay.

L. If, in the opinion of the Engineer, the coordination drawings are in acceptable condition after each has been finally revised and reviewed, the Contractor may submit same as the field record drawings called for elsewhere in the Specifications.

PART 2 PRODUCTS

2.01 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
      b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.02 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Pipeline Seal and Insulator, Inc.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
   3. Pressure Plates: Composite. Include two for each sealing element.
   4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.03 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

F. Right of Way: Give to piping systems installed at a required slope.

G. Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
   1. The Architect shall control the placement of wall and ceiling mounted electrical devices, fixtures, and outlets. The intent is to aesthetically locate fixtures/outlets by providing rough-in hardware, boxes and/or mounting plates, as required, when stud or furring may

not be readily available for direct mounting. When drawing details are not available, consult with Architect's representative for actual placement.

2. Verify all dimensions by field measurements.
3. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-concrete and other structural components, as they are constructed.
4. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
5. Protect all equipment and materials from the elements, dirt and other damage from the time it is removed from the point of storage until final acceptance.
6. No electrical equipment, raceways or other work of any kind shall be covered up or hidden from view before it has been examined and approved. Any unsatisfactory work or materials shall be removed and corrected immediately.
7. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

3.02 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.03 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.04 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.05 CUTTING AND PATCHING

A. General: In addition to the requirements specified in Division 01, the following requirements apply:
   1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
      a. Uncover Work to provide for installation of ill-timed Work.
      b. Remove and replace defective Work.
      c. Remove and replace Work not conforming to requirements of the Contract Documents.
      d. Remove samples of installed Work as specified for testing.
      e. Upon written instructions for the Architect, uncover and restore Work to provide for Architect's observation of concealed work.
   2. Cut, remove, and legally dispose of electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
   3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
   4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and direct to adjacent areas.
   5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
   6. Patch finished surfaces and building components using new materials and methods required for the surface and building components being patched.

3.06 FIELD QUALITY CONTROL

A. Inspect installed sleeve and sleeve-seal installations and associated firestopping for damage and faulty work.

3.07 CLEANING AND PROTECTION

A. On completion of installation, including all systems outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, construction dust, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END SECTION

260519
CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Copper Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

1.03 SUBMITTALS

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

B. Field Quality-Control Test Reports: Provided as part of the O & M Manual.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

B. Comply with local Building Codes.

PART 2 PRODUCTS

2.01 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alpha Wire
   2. Cerro Wire Inc.
   3. Encore Wire Corporation.
   4. Southwire Company.
   5. General Cable.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Types THHN-THWN-2, and XHHW-2.

2.02 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. AFC Cable Systems, Inc.
   2. Hubbell Power Systems, Inc.
   3. O-Z/Gedney; EGS Electrical Group LLC.
   4. 3M; Electrical Products Division.
   5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Copper. ASTM B3, B8, B787 stranding is acceptable.

B. Aluminum is not acceptable.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN-2 or XHHW-2, single conductors in raceway.

B. Feeders: Type THHN-THWN-2 or XHHW-2, single conductors in raceway.

C. Branch Circuits: Type THHN-THWN-2 or XHHW-2, single conductors in raceway.

D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

E. Class 1 Control Circuits: Type THHN-THWN-2, in raceway.

F. Class 2 Control Circuits: Type THHN-THWN-2, in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

3.04 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Electrical Identification."

3.05 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B compliant with the National Electrical Code art. 110.14(D) and 110.3(B).

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.06 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:
   1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
   2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   3. Consult Wire and Cable Manufacturer(s) for additional guidance and recommendation.

C. Test Reports: Prepare a written report to record the following:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace damaged cables and retest as specified above.

END SECTION

260526
GROUNDING AND BONDING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.03 SUBMITTALS

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

B. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
   1. Test wells.
   2. Ground rods.
   3. Ground rings.

C. Grounding arrangements and connections for separately derived systems.

1.04 INFORMATIONAL SUBMITTALS – PROVIDE AS PART OF THE O& M MANUAL

A. Field Quality-Control Test Reports.

B. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. Include the following:
   1. Instructions for periodic testing and inspection of grounding features at test wells, grounding connections for separately derived systems based on NETA MTS.
      a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
      b. Include recommended testing intervals.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a qualified testing agency acceptable to Authorities having jurisdiction, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

C. Comply with local Building Codes.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. Burndy; Part of Hubbell Electrical Systems.
   2. ERICO International Corporation.
   3. Fushi Copperweld Inc.
   4. Harger Lightning and Grounding.
   5. ILSCO.
   6. O-Z/Gedney; A Brand of the EGS Electrical Group.

2.02 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.03 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression -type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.04 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

PART 3 EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
1. Bury at least 24 inches (600 mm) below grade.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.

E. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.03 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.04 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation. Coordinate requirements with local Utility.

3.05 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

F. Signal and Communication Equipment: In addition to grounding and bonding required by CCBC, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.

1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode

system to each service location, terminal cabinet, wiring closet, and central equipment location.

2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch (6.3-by-100-by-300-mm) grounding bus.
3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

H. Metallic Fences: Comply with requirements of IEEE C2.
1. Grounding Conductor: Bare, tinned copper, No. 8 AWG.
2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.06 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes shall be at least 12 inches (300 mm) deep, with cover.
1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

H. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20-feet (6.0 m) long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
   1. Install tinned-copper conductor not less than 500 kcmil for ground ring and for taps to building steel.
   2. Bury ground ring not less than 24-inches (600 mm) from building's foundation.

3.07 LABELING

A. Comply with requirements in "Section 260553 "Electrical Identification" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
   1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.08 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
   2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
   3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
      a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
      b. Perform tests by fall-of-potential method according to IEEE 81.
   4. Prepare dimensioned Drawings locating each test well, ground-rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:
   1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 10 ohms.
   2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
   3. Power and Lighting Equipment or System with Capacity More than 1000 kVA: 3 ohms.
   4. Manhole Grounds: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END SECTION

260533
RACEWAYS AND BOXES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.03 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. FMC: Flexible metal conduit.

D. IMC: Intermediate metal conduit.

E. LFMC: Liquid tight flexible metal conduit.

F. RNC: Rigid nonmetallic conduit.

G. PVC: Polyvinyl Chloride Conduit.

1.04 SUBMITTALS

A. Product Data: For conduit of the types specified, surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
   1. Include catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product for the following:
      a. Retain "Manufacturer's Published Instructions" Subparagraph below when execution requirements state "in accordance with manufacturer's published instructions," especially if those instructions may require preinstallation review and coordination with Construction Documents to verify constructability and commissioning requirements. Coordinate subparagraph with "Informational Submittals" Article.
      b. Fittings for conduit, tubing, and cable.
      c. Electrically conductive corrosion-resistant compounds for threaded conduit.
      d. Solvent cements.
   2. Include manufacturer’s published installation instructions.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
   1. Custom enclosures and cabinets, conduit, and conduit fittings.
   2. For handholes and boxes for underground wiring, including the following:
      a. Duct entry provisions, including locations and duct sizes.
      b. Frame and cover design.
      c. Grounding details.
      d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
      e. Joint details.

1.05 INFORMATIONAL SUBMITTALS – PROVIDE AS PART OF THE O& M MANUAL

A. Source quality-control test reports.

1.06 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

B. Comply with local Building Codes.

PART 2 PRODUCTS

2.01 PERFORMANCE CRITERIA

A. Regulatory Requirements: Listed and labeled in accordance with Local Electrical Code, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2.02 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit, elbows, couplings, and nipples:
   1. Listing:
      a. ANSI C80.1.
      b. UL CCN DYIX; including UL 6.
   2. Exterior Coating: Zinc.
   3. Interior Coating: Zinc with organic top coating.
   4. Colors: When noted on Drawings.

B. Intermediate Metal Conduit, elbows, couplings, and fittings:
   1. Listing:
      a. ANSI C80.6.
      b. UL CCN DYBY; including UL 1242.
   2. Exterior Coating: Zinc.
   3. Interior Coating: Zinc with organic top coating.
   4. Colors: when specifically noted on Drawings.

C. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit, elbows, couplings, and nipples:
   1. Listing:
      a. NEMA RN 1.
      b. UL CCN DYIX
   2. Exterior PVC Coating Thickness: 0.040 inch, minimum.
   3. Interior Urethane Coating Thickness: 0.002 inch.
   4. Pass adhesion test ETL Verified PVC-001.
   5. Manufacturer: Subject to compliance with requirements provide products by one of the following:
      a. Calbond, Atkore International.
      b. Plasti-Bond Red
      c. Engineer approved equal.

D. EMT and fittings:
   1. Listing:
      a. ANSI C80.3.
      b. UL CCN FJMX; including UL 797.
   2. Material: Steel.
   3. Exterior Coating: Zinc.
   4. Interior Coating: Zinc with organic top coating.
   5. Colors: When specifically noted on the drawings.

E. FMC: Steel Flexible Metal Conduit (FMC-S).
   1. Listing: UL CCN DXUZ -
   2. Material: Zinc coated steel.
   3. Colors: When specifically noted on the drawings.

F. LFMC: Liquid Tight Flexible Metal Conduit and fittings:
   1. Listing: UL DXHR including UL 360.
   2. Material: Steel.
   3. Colors: when specifically noted on Drawings.

G. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Compression type with insulated throat.
3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

H. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.03 NONMETALLIC CONDUIT AND TUBING

A. RNC: Rigid Non-Metallic Conduit, Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:
1. Listing:
a. NEMA TC 2.
b. UL DZYR -
2. Dimensional Specifications: Schedule 40.
3. Minimum Trade Size: 1 1/2 in.
4. Markings: For use with maximum 90 deg C wire.

B. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

2.04 METAL WIREWAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type.

E. Finish: Manufacturer's standard enamel finish.

2.05 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Thomas & Betts Corporation.
b. Walker Systems, Inc.; Wiremold Company (The).
c. Wiremold Company (The); Electrical Sales Division.

2.06 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.
8. Thomas & Betts Corporation.
9. Walker Systems, Inc.; Wiremold Company (The).

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. See Editing Instruction No. 2 in the Evaluations for a discussion of floor boxes.

E. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

I. Cabinets:
   1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.

2.07 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Description: Comply with SCTE 77.
   1. Color of Frame and Cover: Gray.
   2. Configuration: Units shall be designed for flush burial and have integral closed bottom, unless otherwise indicated.
   3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
   4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
   5. Cover Legend: Molded lettering, as indicated for each service.
   6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
   7. Handholes 36-inches wide by 36-inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armorcast Products Company.
   2. Carson Industries LLC.
   3. CDR Systems Corporation.
   4. NewBasis.
   5. Quazite.

2.08 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

B. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.

C. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 EXECUTION

3.01 RACEWAY APPLICATION

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with Local Electrical Code for selection of raceways. Consult Architect for resolution of conflicting requirements.

B. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
   1. Exposed Conduit: Rigid steel conduit.
   2. Concealed Conduit, Aboveground: Rigid steel conduit.
   3. Underground Conduit, Not Subject to Vehicular Traffic: [Rigid steel conduit, direct buried] [RNC, type EPC-40-PVC].
   4. Underground Conduit, Subject to Vehicular Traffic: [Rigid steel conduit] [RNC, type EPC-40-PVC], concrete-encased.
   5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
   6. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
   7. Application of Handholes and Boxes for Underground Wiring:
      a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: SCTE 77, Tier 15 structural load rating.
      b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: SCTE 77, Tier 8 structural load rating.
      c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Structurally tested according to SCTE 77 with 3000-lbf vertical loading.

C. Comply with the following indoor applications, unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed, Not Subject to Severe Physical Damage: EMT.
   3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      c. Mechanical rooms.
   4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
   5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
   6. Damp or Wet Locations: Rigid steel conduit.
   7. Within Concrete Slabs above Grade: EMT with concrete-tight fittings.
   8. Within or Below Slab on Grade: Rigid steel conduit.
   9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

D. Minimum Raceway Size: 3/4-inch trade size.

E. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
   2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material.

3.02 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

G. Raceways Embedded in Slabs:
   1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
   2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

K. Raceways for Optical Fiber and Communications Cable: Install raceways, as follows:
   1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
   2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
   3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by local Building Code.

M. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations subject to severe physical damage.
   2. Use LFMC in damp or wet locations not subject to severe physical damage.

N. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall.

O. Set metal floor boxes level and flush with finished floor surface.

P. Use tools and installation practices recommended by the manufacturer when installing PVC-Coated Conduit.

Q. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings.

R. Use sealant recommended by PVC coated conduit and fitting manufacturer.

3.03 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
   1. Excavate trench bottom to provide firm and uniform support for conduit.
   2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength.
   3. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
      a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete.
      b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes and boxes with bottom below the frost line.

E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

C. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END SECTION

260553
ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.03 SUBMITTALS

A. Product Data: For each electrical identification product indicated. Submit data for:
1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with local Building Codes.

C. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:
1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

D. Signs, labels, and tags required for personnel safety must comply with the following standards:
1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

E. Comply with NFPA 70E and Section 260573 "Overcurrent Protective Device Short Circuit, Coordination and Arc Flash Study" requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F, ambient.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.02 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.03 FLOOR MARKING TAPE

A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.04 UNDERGROUND-LINE WARNING TAPE

A. Tape:
   1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   2. Printing on tape shall be permanent and shall not be damaged by burial operations.
   3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:
   1. Comply with ANSI Z535.1 through ANSI Z535.5.
   2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
   3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Material:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft.
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.05 WARNING LABELS AND SIGNS

A. Comply with CCBC and 29 CFR 1910.145.

B. Baked-Enamel Warning Signs:
1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

C. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES “.

2.06 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.07 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.08 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except were used for color-coding.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 9 for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

G. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

H. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

I. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

J. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

K. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
   1. Outdoors: UV-stabilized nylon.
   2. In Spaces Handling Environmental Air: Plenum rated.

L. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

M. Emergency Operating Instruction Signs: Install instruction signs with white legend on red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer or load shedding.

N. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

O. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
   1. "EMERGENCY POWER."
   2. "POWER."
   3. "UPS."
   4. AUTOMATIC TRANSFER SWITCH.

P. Vinyl Wraparound Labels:
   1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
   2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

Q. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.

R. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

S. Self-Adhesive Labels:
   1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
   2. Unless otherwise indicated, provide single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inch high.

T. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

U. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

V. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.

W. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.
   1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

X. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

Y. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.

Z. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

AA. Painted Identification: Comply with requirements in Division 9 for surface preparation and paint application.

BB. Metal Tags:
   1. Place in location with high visibility and accessibility.
   2. Secure using general-purpose, UV-stabilized or plenum-rated cable ties depending upon location application.

CC. Nonmetallic Preprinted Tags:
   1. Place in location with high visibility and accessibility.
   2. Secure using general-purpose, UV-stabilized or plenum-rated cable ties depending upon location application.

DD. Write-on Tags:
   1. Place in location with high visibility and accessibility.
   2. Secure using general-purpose, UV-stabilized or plenum-rated cable ties depending upon location application.

EE. Baked-Enamel Signs:
   1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
   2. Unless otherwise indicated, provide single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inch high.

FF. Metal-Backed Butyrate Signs:
   1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
   2. Unless otherwise indicated, provide single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inch high.

GG. Laminated Acrylic or Melamine Plastic Signs:
   1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
   2. Unless otherwise indicated, provide single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inch high.

HH. Cable Ties: General purpose, for attaching tags, except as listed below:
   1. Outdoors: UV-stabilized nylon.
   2. In Spaces Handling Environmental Air: Plenum rated.

3.02 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
   1. Emergency Power.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
   1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
      a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
      b. Colors for 208/120-V Circuits:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Grounded Conductor: White
         5) Grounding Conductor: Green
      c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags.

D. Install instructional sign, including the color-code for grounded and ungrounded conductors, using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
   1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
   2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
   3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
   1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by CCBC and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.
   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.
   4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
      a. Power transfer switches.
      b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

L. Arc Flash Warning Labeling: Self-adhesive labels. Comply with the requirements of NFPA 70E and the specification Section 260573 Overcurrent Protective Devices Short Circuit, Coordination and Arc Flash Study".

M. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
   1. Labeling Instructions:
      a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
      b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
      c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
   2. Equipment to Be Labeled:
      a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification on the panel cover
      b. Panelboards, enclosures, and electrical cabinets identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
      c. Access doors and panels for concealed electrical items.
      d. Switchgear.
      e. Switchboards.
      f. Transformers: Label that includes tag designation indicated on Drawings for transformer, feeder, and panelboards or equipment supplied by secondary.
      g. Substations.
      h. Emergency system boxes and enclosures.
      i. Motor-control centers.
      j. Enclosed switches.
      k. Enclosed circuit breakers.
      l. Enclosed controllers.
      m. Variable-speed controllers.
      n. Push-button stations.
      o. Power-transfer equipment.
      p. Contactors.
      q. Remote-controlled switches, dimmer modules, and control devices.
      r. Battery-inverter units.
      s. Battery racks.
      t. Power-generating units.
      u. Monitoring and control equipment.
      v. UPS equipment.

END SECTION

260573
OVERCURRENT PROTECTIVE DEVICE SHORT CIRCUIT, COORDINATION AND ARC FLASH STUDY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes computer-based studies:
   1. Fault-current study, to determine the minimum interrupting capacity of circuit protective devices.
   2. Overcurrent protective device coordination to determine overcurrent protective devices and their settings for selective tripping.
   3. Arc flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment and define acceptable level of PPE (Personnel Protective Equipment).

1.03 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.04 SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

C. Qualification Data: For coordination-study specialist.

D. The following submittals shall be made after the approval process for system protective devices has been completed. Submittals shall be in printed and digital form, signed, dated, and sealed by a qualified professional engineer.
   1. Short-circuit study input data, including completed computer program input data sheets.
   2. Short-circuit study and equipment evaluation report;
   3. Include original one-line diagram as a scope document for the short-circuit study.
   4. Revised single-line diagram, reflecting as-built conditions, existing system field investigation results and results of short-circuit study.
   5. Coordination-study input data, including completed computer program input data sheets.
   6. Study and Equipment Evaluation Reports.
   7. Overcurrent protective device coordination study and equipment evaluation report.
   8. Arc-flash study input data, including completed computer program input data sheets.
   9. Arc-flash study report.
   10. Submit study reports for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment

manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

E. Operation and Maintenance Data: For the overcurrent protective devices to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in Division 1, include the following:
      a. The following parts from the Protective Device Coordination Study Report:
         1) One-line diagram.
         2) Protective device coordination study.
         3) Time-current coordination curves.
      b. Power system data.
   2. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.
   3. Operation and Maintenance Procedures: In addition to items specified in Division 1, provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.05 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
   1. Professional Engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.

C. Comply with IEEE 399 for general study procedures.

PART 2 PRODUCTS

2.01 COMPUTER SOFTWARE DEVELOPERS

A. Computer Software Developers: Subject to compliance with requirements, provide products by one of the following:
   1. CGI CYME.
   2. EDSA Micro Corporation.
   3. ESA Inc.
   4. SKM Systems Analysis, Inc.

2.02 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

2.03 STUDY REPORT CONTENT

A. Executive summary.

B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.

C. One-line diagram, showing the following:
   1. Protective device designations and ampere ratings.
   2. Cable size and lengths.

3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations.

D. Short-Circuit Study:
1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Equivalent impedance.
2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Calculated asymmetrical fault currents:
      1) Based on fault-point X/R ratio.
      2) Based on calculated symmetrical value multiplied by 1.6.
      3) Based on calculated symmetrical value multiplied by 2.7.
3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.

E. Protective Device Coordination Study:
1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
   a. Ground Relays:
      1) Device tag.
      2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
      3) Recommendations on improved relaying systems, if applicable.
   b. Circuit Breakers:
      1) Adjustable pickups and time delays (long time, short time, ground).
      2) Adjustable time-current characteristic.
      3) Adjustable instantaneous pickup.
      4) Recommendations on improved trip systems, if applicable.
   c. Fuses: Show current rating, voltage, and class.
2. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
   a. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
   b. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
   c. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
   d. Plot the following listed characteristic curves:
      1) Device tag.
      2) Voltage and current ratio for curves.

3) Maximum fault-current cutoff point.
4) Power utility's overcurrent protective device.
5) Medium-voltage equipment overcurrent relays.
6) Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
7) Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
8) Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
9) Three-phase and single-phase damage points for each transformer.
10) No damage, melting, and clearing curves for fuses.
11) Cables and conductors damage curves.
12) Ground-fault protective devices.
13) Motor-starting characteristics and motor damage points.
14) Generator short-circuit decrement curve and generator damage point.
15) The largest feeder circuit breaker in each motor-control center and panelboard.

e. Provide adequate time margins between device characteristics such that selective operation is achieved.
f. Include:
1) Comments and recommendations for system improvements.
2) Completed data sheets for setting of overcurrent protective devices.

3. Series rating on equipment allows the application of two series interrupting devices for a condition where the available fault current is greater than the interrupting rating of the downstream equipment. Bot devices share in the interruption of the fault and selectivity is sacrificed at high fault levels. Maintain selectivity for tripping currents caused by overloads.
4. Provide adequate time margins between device characteristics such that selective operation is achieved.

F. Arc Flash Study:
1. Incident Energy and Flash Protection Boundary Calculations:
a. Arcing fault magnitude.
b. Protective device clearing time.
c. Duration of arc.
d. Arc-flash boundary.
e. Working distance.
f. Incident energy.
g. Hazard risk category.
h. Recommendations for arc-flash energy reduction.
2. Arc Flash Warning labels:
a. Comply with requirements in Section 260553 "Electrical Identification”. Produce a 3.5-by-5-inch (76-by-127-mm) thermal transfer label of high-adhesion polyester for each work location included in the analysis.
b. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
1) Location designation.
2) Nominal voltage.
3) Flash protection boundary.
4) Hazard risk category.
5) Incident energy.
6) Working distance.
7) Engineering report number, revision number, and issue date.
c. Labels shall be machine printed, with no field-applied markings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.
   1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.02 POWER SYSTEM DATA

A. Obtain all data necessary for the conduct of the study.
   1. Verify completeness of data supplied on the one-line diagram. Call any discrepancies to the attention of Architect.
   2. For equipment provided that is Work of this Project, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
   3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E.

B. Gather and tabulate the following input data to support the short-circuit study. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.
   1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
      a. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance.
      b. Proceed with coordination study only after relevant equipment submittals have been assembled.
      c. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.
   2. Obtain electrical power utility impedance at the service.
   3. Power sources and ties.
   4. Short-circuit current at each system bus, three phase and line-to-ground.
   5. Full-load current of all loads.
   6. Voltage level at each bus.
   7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
   8. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
   9. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
   10. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
   11. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
   12. Motor horsepower and NEMA MG 1 code letter designation.

13. Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
14. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Generator thermal-damage curve.
    e. Ratings, types, and settings of utility company's overcurrent protective devices.
    f. Special overcurrent protective device settings or types stipulated by utility company.
    g. Time-current-characteristic curves of devices indicated to be coordinated.
    h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
    i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
    j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.03 SHORT CIRCUIT STUDY

A. Perform study following the general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on the device characteristics supplied by device manufacturer.

D. The extent of the electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:
    1. To normal system low-voltage load buses.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.
    1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:
    1. Electric utility's supply termination point.
    2. Incoming switchgear.
    3. Unit substation primary and secondary terminals.
    4. Low-voltage switchgear.
    5. Motor-control centers.
    6. Control panels.
    7. Standby generators and automatic transfer switches.
    8. Branch circuit panelboards.
    9. Disconnect switches.

3.04 PROTECTIVE DEVICE COORDINATION STUDY

A. Transformer Primary Overcurrent Protective Devices:
   1. Device shall not operate in response to the following:
      a. Inrush current when first energized.
      b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
      c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
   2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

B. Motor Protection:
   1. Select protection for low-voltage motors according to IEEE 242 and applicable local Codes.
   2. Select protection for motors served at voltages more than 600 V according to IEEE 620.

C. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

D. Generator Protection: Select protection according to manufacturer's written recommendations and to IEEE 242.

E. Protective Device Evaluation:
   1. Evaluate equipment and protective devices and compare to short-circuit ratings.
   2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.

3.05 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Use the short-circuit study output and the field-verified settings of the overcurrent devices.

C. Calculate maximum and minimum contributions of fault-current size.
   1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
   2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.

E. Include medium- and low-voltage equipment locations.

F. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.

G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:
   1. Fault contribution from induction motors should not be considered beyond three to five cycles.
   2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g., contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).

H. Arc-flash computation shall include both line and load side of a circuit breaker as follows:

1. When the circuit breaker is in a separate enclosure.
2. When the line terminals of the circuit breaker are separate from the work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.06 ADJUSTING

A. Adjust relay and protective device settings according to the recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.

3.07 LABELING

A. Apply one arc-flash label for 600-V ac, 480-V ac, and applicable 208-V ac panelboards and disconnects and for each of the following locations:
   1. Motor-control center.
   2. Low-voltage switchboard.
   3. Switchgear.
   4. Medium-voltage switch.
   5. Control panel.

3.08 APPLICATION OF WARNING LABELS

A. Install the arc-fault warning labels under the direct supervision and control of the Arc-Flash Study Specialist.

3.09 DEMONSTRATION

A. Train Owner's maintenance personnel in the following:
   1. Acquaint personnel in the fundamentals of operating the power system in normal and emergency modes.
   2. Hand-out and explain the objectives of the coordination study, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting the time-current coordination curves.
   3. Train Owner's operating and maintenance personnel in the use of study results.
   4. Adjust, operate, and maintain overcurrent protective device settings.

B. Train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END SECTION

SECTION 260923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, Adopted January 1, 2022, shall be used for all applicable procedures in this Section.
   1. The method of measurement identified in IDOT's Standard Specifications shall be utilized to record a final quantity amount required to complete the work.
   2. The basis of payment identified in IDOT's Standard Specifications shall be utilized to complete the work.

B. When IDOT Standard Pay Items are listed for work items, IDOT Standard Specifications should be utilized. Section 100 shall govern General Requirements. Materials and construction requirements associated with standard pay items shall take precedence over the work task.

C. Where the IDOT Standard Specifications do not provide enough guidance, the drawings and general provisions of the Contract, including General and Supplementary Conditions and other direction found in this specification section, shall be applied. Any disagreement between IDOT Standard Specifications and the language found in this section shall be brought to the Engineer to provide final direction prior to the start of any work related to this section.

1.02 SUMMARY

A. Section Includes:
   1. Time switches.
   2. Snap Switches.
   3. Photoelectric switches.
   4. Lighting contactors.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Interconnection diagrams showing field-installed wiring.
   2. Include diagrams for power, signal, and control wiring.

1.04 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's warranties.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

1.06 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Faulty operation of lighting control devices.
   2. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Area Lighting Research, Inc.; Tyco Electronics.
   2. Grasslin Controls Corporation; a GE Industrial Systems Company.

3. Intermatic, Inc.
4. Leviton Mfg. Company Inc.
5. Lightolier Controls; a Genlyte Company.
6. Paragon Electric Co.; Invensys Climate Controls.
7. TORK.
8. Watt Stopper (The).

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
1. Listed and labeled as defined in NFPA 70 and marked for intended location and application.
2. Contact Configuration: SPST.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Programs: Six (6) channels; each channel is individually programmable with eight on-off set points on a 24-hour schedule.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.02 SNAP SWITCHES

A. General Description: Comply with NEMA WD 1 and UL 20 and FS W-S-896.
1. Back and side wired, terminals to accept up to #10AWG wire.
2. Specification grade, heavy-duty type.
3. Ground screw terminal.

B. Switches, 120/277 V, 20 A

C. Pilot Light Switches, 20 A
1. Description: Single pole, with neon-lighted handle, illuminated when switch is "OFF."

D. Key-Operated Switches, 120/277 V, 20 A
1. Description: Single pole, with factory-supplied key in lieu of switch handle.

E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.

F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

2.03 OUTDOOR PHOTOELECTRIC DIMMING CONTROLS, LOW VOLTAGE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Acuity Brands.

B. Description: Solid state, with SPST dry contacts rated for 1800 VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
3. Time Delay: Fifteen-second minimum, to prevent false operation.
4. Surge Protection: Metal-oxide varistor.

5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
6. Failure Mode: Luminaire stays ON.

2.04 WALL PLATES

A. Single and combination types to match corresponding wiring devices.
   1. Material and color as specified in Specification section ‘Wiring Devices’.

2.05 FINISHES

A. Color
   1. Lighting Control Devices Connected to Normal Power System: Coordinate with other wiring devices specified under Section ‘Wiring Devices’ and lighting control wall stations as specified in Section ‘Network Lighting Control System’ unless otherwise indicated or required by NEC or device listing.
   2. Wiring Devices Connected to Emergency Power System: Red.

2.06 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. ASCO Power Technologies, LP; a division of Emerson Electric Co.
   2. Eaton Electrical Inc.; Cutler-Hammer Products.
   3. GE Industrial Systems; Total Lighting Control.
   4. Square D; Schneider Electric

B. Description: Electrically operated and mechanically held, combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.
   1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).
   2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
   3. Enclosure: Comply with NEMA 250.
   4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

2.07 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 GENERAL INSTALLATION

A. Comply with NECA 1.

B. All devices, and associated components shall be rated for the environment that they are installed in for both startup and running operation, including but not limited to ingress protection rating, and high and low temperature environment.

C.

3.03 CONTACTOR INSTALLATION

A. Comply with NECA 1.

B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.04 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4-inch.

C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.05 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
   1. Identify controlled circuits in lighting contactors.
   2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.06 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices shall be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.07 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.08 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

PART 4 METHOD OF MEASUREMENT

A. Time switches, snap switches, and lighting contractors will not be measured separately for payment but will be included in the cost of installing light poles, foundations, and luminaires/fixtures.

B. Lighting Controllers shall be measured as EACH per controller installed.

PART 5 BASIS OF PAYMENT

A. Time switches, snap switches, and lighting contractors will not be measured separately for payment but will be included in the cost of installing light poles, foundations, and luminaires/fixtures.

B. Work will be paid for at the Contract Unit Price per Each of LIGHTING CONTROLLER (SPECIAL) for the lighting controller unit specified in the plans, which price shall be considered payment in full for all labor, equipment, and material necessary to complete the work as specified.

END SECTION

260943.23
RELAY-BASED LIGHTING CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Lighting control relay panels.
   2. Networked lighting control panels.
   3. Manual switches and cover plates.
   4. Field-mounted signal sources.
   5. Conductors and cables.

1.02 DEFINITIONS

A. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

1.03 ACTION SUBMITTALS

A. Product Data:
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and cover plates, and conductors and cables.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
   3. Sound data including results of operational tests of central dimming controls.
   4. Operational documentation for software and firmware.

B. Shop Drawings: For each relay panel and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than Type 1.
   3. Detail wiring partition configuration, current, and voltage ratings.
   4. Short-circuit current rating of relays.
   5. Address Drawing: Reflected ceiling plan and floor plans, showing connected luminaires, address for each luminaire, and luminaire groups. Base plans on construction plans, using the same legend, symbols, and schedules.
   6. Point List and Data Bus Load: Summary list of all control devices, sensors, ballasts, and other loads. Include percentage of rated connected load and device addresses.
   7. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
   8. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

C. Field quality-control reports.

1.04 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lighting Control Relays: Equal to 10 percent of amount installed for each size indicated, but no fewer than 2.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation in accordance with NECA 407.

1.07 WARRANTY

A. Special Manufacturer Extended Warranty: Manufacturer warrants that components of standalone multipreset modular dimming controls perform in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within extended warranty period.
   1. Initial Extended Warranty Period: Five years from date of Substantial Completion, for labor, materials, and equipment.
   2. Follow-on Extended Warranty Period: Eight years from date of Substantial Completion, for materials that failed because of transient voltage surges only, f.o.b. the nearest shipping point to Project site.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Sequence of Operations: Input signal from field-mounted manual switches, or digital signal sources, must open or close one or more lighting control relays in the lighting control panels. Any combination of inputs must be programmable to any number of control relays.

B. Surge Protective Device: Factory installed as an integral part of control components or field-mounted surge suppressors complying with UL 1449, SPD Type 2.

C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70 by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

D. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.

E. Comply with UL 916.

2.02 LIGHTING CONTROL RELAY PANELS

A. MANUFACTURERS
   3. Acceptable Manufacturers:
      a) Acuity Brands, Inc: https://www.acuitybrands.com/

B. Description: Standalone dimming lighting control panel using mechanically latched relays to control lighting and appliances.

C. Lighting Control Panel:
   1. A single enclosure with incoming lighting branch circuits, control circuits, switching relays, and on-board timing and control unit.
   2. A vertical barrier separating branch circuits from control wiring.

D. Control Unit: Contain the power supply and electronic control for operating and monitoring individual relays.
   1. Timing Unit:
      a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
      b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
      c. Four independent schedules, each having 24 time periods.
      d. Schedule periods settable to the minute.
      e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
      f. 10 special date periods.
   2. Sequencing Control with Override:
      a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.

b. Sequencing control must operate relays one at a time, completing the operation of all connected relays in not more than 10 seconds.
c. Override control must allow any relay connected to it to be switched on or off by a field-deployed manual switch or by an automatic switch, such as an occupancy sensor.
d. Override control "blink warning" must warn occupants approximately five minutes before actuating the off sequence.

3. Nonvolatile memory must retain all setup configurations. After a power failure, the controller must automatically reboot and return to normal system operation, including accurate time of day and date.

E. Relays:
1. Electrically operated, mechanically held single-pole switch, rated at 20 A at 277 V. Short-circuit current rating must be not less than 5 kA. Control must be three-wire, 24 V(ac).
2. Electrically operated, mechanically held single-pole switch, rated at 20 A at 120 V for tungsten, 30 A at 277 V for ballast, 1.5 hp at 120 V, and 3 hp at 277 V. Short-circuit current rating must be not less than 14 kA. Control must be three-wire, 24 V(ac).

F. Power Supply: NFPA 70, Class 2, sized for connected equipment, plus 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, control-voltage inputs, field-installed occupancy sensors, and photo sensors.

G. Operator Interface:
1. Integral alphanumeric keypad and digital display, and intuitive drop-down menus to assist in programming.
2. Log and display relay on-time.
3. Connect relays to one or more time and sequencing schemes.

2.03 NETWORKED LIGHTING CONTROL PANELS

A. MANUFACTURERS
1. Acceptable Manufacturers:
a) Acuity Brands, Inc: https://www.acuitybrands.com/

B. Description: Lighting control panels using mechanically latched relays to control lighting and appliances. The panels must be capable of being interconnected with digital communications to appear to the operator as a single lighting control system.

C. Lighting Control Panels:
1. A single enclosure with incoming lighting branch circuits, control circuits, switching relays, and on-board timing and control unit.
2. A vertical barrier separating branch circuits from control wiring.

D. Main Control Unit: Installed in the main lighting control panel only; powered from the branch circuit of the standard control unit.
1. Ethernet Communications: Comply with TCP/IP protocol. The main control unit must provide for programming of all control functions of the main and all networked slave lighting control panels including timing, sequencing, and overriding.
2. Web Server: Display information listed below over a standard Web-enabled server for displaying information over a standard browser.
a. A secure, password-protected login screen for modifying operational parameters, accessible to authorized users via Web page interface.
b. Panel summary showing the master and slave panels connected to the controller.
c. Controller diagnostic information.
d. Show front panel mimic screens for setting up controller parameters, input types, zones, and operating schedules. These mimic screens must also allow direct breaker control and zone overrides.
3. Timing Unit:

a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
c. Four independent schedules, each having 24 time periods.
d. Schedule periods settable to the minute.
e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
f. 16 special date periods.

4. Time Synchronization: The timing unit must be updated not less than every 24 hours with the network time server.
5. Sequencing Control with Override:
   a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.
   b. Sequencing control must operate relays one at a time, completing the operation of all connected relays in not more than 10 seconds.
   c. Override control must allow any relay connected to it to be switched on or off by a field-deployed manual switch or by an automatic switch, such as an occupancy sensor.
   d. Override control "blinking warning" must warn occupants approximately five minutes before actuating the off sequence.
   e. Activity log, storing previous relay operation, including the time and cause of the change of status.
   f. Download firmware to the latest version offered by manufacturer.

E. Standard Control Unit, Installed in All Lighting Control Panels: Contain electronic controls for programming the operation of the relays in the control panel, contain the status of relays, and contain communications link to enable the digital functions of the main control unit. Comply with UL 916.
1. Electronic control for operating and monitoring individual relays, and display relay on-time.
2. Nonvolatile memory must retain all setup configurations. After a power failure, the controller must automatically reboot and return to normal system operation.
3. Integral keypad and digital-display front panel for local setup, including the following:
   a. Blink notice, time adjustable from software.
   b. Ability to log and display relay on-time.
   c. Capability for accepting downloadable firmware so that the latest production features may be added in the future without replacing the module.

F. Relays:
1. Electrically operated, mechanically held single-pole switch, rated at 20 A at 277 V. Short-circuit current rating must be not less than 5 kA. Control must be digital control network.
2. Electrically operated, mechanically held single-pole switch, rated at 20 A at 120 V for tungsten, 30 A at 277 V for ballast, 1.5 hp at 120 V, and 3 hp at 277 V. Short-circuit current rating must be not less than 14 kA. Control must be digital control network.

G. Power Supply: NFPA 70, Class 2, UL listed, sized for connected equipment, plus not less than 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, control-voltage inputs, field-installed occupancy sensors, and control-voltage photo sensors.

H. Operator Interface: At the main control unit, provide interface for a tethered connection of a portable PC running MS Windows for configuring all networked lighting control panels using setup software designed for the specified operating system. Include one portable device for initial programming of the system and training of Owner's personnel. That device must remain the property of Owner.

I. Software:

1. Menu-driven data entry.
2. Online and offline programming and editing.
3. Provide for entry of the room or space designation for the load side of each relay.
4. Monitor and control all relays, showing actual relay state and the name of the automatic actuating control, if any.
5. Size the software appropriate to the system.

2.04 MANUAL SWITCHES AND COVER PLATES

A. Push-Button Switches: Modular, momentary contact, three wire, for operating one or more relays and to override automatic controls.
   1. Match color and style specified in Section 262726 "Wiring Devices."
   2. Integral green LED pilot light to indicate when circuit is on.
   3. Internal white LED locator light to illuminate when circuit is off.

B. Cover Plates: Single and multigang cover plates as specified in Section 262726 "Wiring Devices."

C. Legend: Engraved or permanently silk-screened on cover plate where indicated. Use designations indicated on Drawings.

2.05 FIELD-MOUNTED SIGNAL SOURCES

A. Daylight Harvesting Switching Controls: Comply with Section 260923 "Lighting Control Devices." Control power may be taken from the lighting control panel, and signal must be compatible with the relays.

B. Indoor Occupancy Sensors and Extreme-Temperature Occupancy Sensors: Comply with Section 260923 "Lighting Control Devices." Control power may be taken from the lighting control panel, and signal must be compatible with the relays.

2.06 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

C. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

D. Twisted-Pair Data Cable: Category 6
   1. Comply with requirements for twisted pair cabling in Section 260523 "Control-Voltage Electrical Power Cables."
   2. Comply with requirements in Section 271513 "Communications Copper Horizontal Cabling."

PART 3 EXECUTION

3.01 EXAMINATION

A. Receive, inspect, handle, and store panels in accordance with NECA 407.

B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF WIRING

A. Wiring Methods:

1. Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters.
2. Install cables in raceways and cable trays except within consoles, cabinets, desks, counters, accessible ceiling spaces, and gypsum board partitions where unenclosed wiring method may be used.
3. Install conductors and cables concealed in accessible ceilings, walls, and floors where possible.
4. Conceal raceway and cables except in unfinished spaces.
5. Provide plenum-rated cable, where installed exposed or in open cable tray, within environmental airspaces, including plenum ceilings.
6. Comply with requirements for cable trays specified in Section 260536 "Cable Trays for Electrical Systems."
7. Comply with requirements for raceways specified in Section 260533.13 "Conduits for Electrical Systems."

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.03 INSTALLATION OF PANELS

A. Install panels and accessories in accordance with NECA 407.

B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Mount top of trim 90 inch (2286 mm) above finished floor unless otherwise indicated.

D. Mount panel cabinet plumb and rigid without distortion of box.

E. Install filler plates in unused spaces.

3.04 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.05 FIELD QUALITY CONTROL

A. Field tests must be witnessed by Architect and Tenant

B. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers described below and low-voltage surge arrestors. Certify compliance with manufacturer's test parameters.
   a. Circuit-Breaker Tests:
      1) Compare nameplate with Drawings and Specifications.
      2) Inspect physical and mechanical conditions.
      3) Inspect anchorage and alignment.
      4) Verify that the units are clean.
      5) Operate the circuit breaker to ensure smooth operation.
      6) Inspect bolted electrical connections for high resistance using one or more of the following methods:

a) A low-resistance ohmmeter.
b) Verify tightness of bolted electrical connections by calibrated torque wrench.
c) Thermographic survey.

7) Inspect operating mechanism, contacts, and arc chutes in unsealed units.
8) Perform adjustments for final protective device settings in accordance with the overcurrent protective device coordination study. Comply with requirements in Section 260573.16 "Coordination Studies."
9) Perform insulation resistance tests for one minute on each pole, phase-to-phase, and phase-to-ground with the circuit breaker closed and across each pole using manufacturer's published data.
10) Perform a contact/pole-resistance test.
11) Perform insulation-resistance tests on control wiring with respect to ground. Applied potential must be 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable. Test duration must be for one minute. Follow manufacturer's instructions for solid-state units.
12) Determine long-time pickup and delay by primary current injection.
13) Determine short-time pickup and delay by primary current injection.
14) Determine ground-fault pickup and time delay by primary current injection.
15) Determine instantaneous pickup by primary current injection.
16) Test functions of the trip unit by means of secondary injection.
17) Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data.
18) Verify correct operation of auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, anti-pump function, and trip unit battery condition. Reset trip logs and indicators.
19) Verify operation of charging mechanism.

b. Surge Arrestor Tests:
1) Compare nameplate with the Contract Documents.
2) Inspect physical and mechanical conditions.
3) Inspect anchorage, alignment, grounding, and clearances.
4) Verify that the units are clean.
5) Inspect bolted electrical connections for high resistance using one or more of the following methods:
a) Low-resistance ohmmeter.
b) Verify tightness of bolted electrical connections by calibrated torque wrench.
6) Verify that the ground lead on each device is individually attached to a ground bus or ground electrode.
7) Perform an insulation-resistance test on each arrestor, phase terminal-to-ground using voltage in accordance with manufacturer instructions.
8) Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding tests.

C. Nonconforming Work:
1. Lighting control panel will be considered defective if it does not pass tests and inspections.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

E. Manufacturer Services:
1. Engage factory-authorized service representative to support field tests and inspections.

3.06 SYSTEM STARTUP

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks in accordance with manufacturer's instructions.
   2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system in accordance with approved configuration schedules, time-of-day schedules, and input override assignments.

3.07 ADJUSTING

A. Occupancy Adjustments: Within 12 months from date of Substantial Completion, provide a free of charge on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.08 MAINTENANCE

A. Software and Firmware Service Agreement:
   1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software support for five years.
   2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within ten years from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.
      a. Upgrade Notice: No fewer than 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.
   3. Upgrade Reports: Prepare written report after each update, documenting upgrades installed.

END SECTION

262416
PANELBOARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Distribution panelboards.
   2. Lighting and appliance branch-circuit panelboards.

1.03 SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   6. Include wiring diagrams for power, signal, and control wiring.
   7. Provide product data, wiring diagrams and installation drawings for submetering system when indicted on the drawings.
   8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Include selectable ranges for each type of overcurrent protective device.

C. Panelboard Schedules: For installation in panelboards: Submit after final load balancing.

1.04 INFORMATIONAL SUBMITTALS – PROVIDE AS PART OF THE O& M MANUAL

A. Field Quality-Control Reports:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

B. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. Include the following:
   1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
   2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a qualified testing agency and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with Local Building Codes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.07 PROJECT CONDITIONS

A. Environmental Limitations:
1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C**)** to plus 104 deg F (plus 40 deg C).
   b. Altitude: Not exceeding 6600 feet (2000 m).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Owner no fewer than -two- days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's written permission.
3. Comply with NFPA 70E.

1.08 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Keys: Two spares for each type of panelboard cabinet lock.

2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets as indicated on panel schedules.
   1. Rated for environmental conditions at installed location.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
      b. Outdoor Locations: NEMA 250, Type 3R.
      c. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
      d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
      e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.
   2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
   3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims must cover live parts and may have no exposed hardware.
   4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
   5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
   6. Finishes:
      a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
      b. Back Boxes: Same finish as panels and trim.
   7. Directory Card: Inside panelboard door, mounted in transparent card holder.

B. Incoming Main:
   1. Location: Top or bottom as determined by field conditions.
   2. Main Breaker: Main lug interiors up to 400 A must be field convertible to main breaker.

C. Phase, Neutral, and Ground Buses:
   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
   3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
   4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure.
   5. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
   6. Split Bus: Vertical buses divided into individual vertical sections.

D. Conductor Connectors: Suitable for use with conductor material and sizes.
   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Main and Neutral Lugs: Mechanical type.
   3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
   4. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

E. Adjustments for Oversized Conductors: Provide suitable means to terminate conductor sizes and quantities for supply and load feeders indicated on the drawings, including but not limited to larger lugs, buses, or overcurrent protective device frame sizes.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Include mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.02 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in or Bolt-on circuit breakers.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

E. Surge Suppression: Factory installed as integral part of indicated panelboards, complying with UL 1449 SPD Type 1.
1. When integral to the panelboard the SPD shall be from the same manufacturer as the panelboard.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

E. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.

F. Surge Suppression: Factory installed as integral part of indicated panelboards, complying with UL 1449 SPD Type 2.
1. When integral to the panelboard the SPD shall be from the same manufacturer as the panelboard.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.

3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

C. MCCB: Comply with UL 489, with full interrupting capacity to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers:
      a. Inverse time-current element for low-level overloads.
      b. Instantaneous magnetic trip element for short circuits.
      c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   3. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
   4. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
   5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Standard frame sizes, trip ratings, and number of poles.
      c. Breaker handle indicates tripped status.
      d. UL listed for reverse connection without restrictive line or load ratings.
      e. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
      f. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
      g. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
      h. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 60 percent of rated voltage.
      i. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
      j. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
      k. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
      l. Rating Plugs: Three-pole breakers with ampere ratings greater than 150A must have interchangeable rating plugs or electronic adjustable trip units.
      m. Auxiliary Contacts: Two, SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
      n. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
      o. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key must be removable only when circuit breaker is in off position.
      p. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
      q. Multipole units enclosed in single housing with single handle.
   6. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.

7. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6 mA trip).
8. GFEP Circuit Breakers: Class B ground-fault protection (30 mA trip).
9. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240 V, single-pole configuration.
10. Sub feed Circuit Breakers: Vertically mounted.

D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
1. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.
2. Mechanical cover interlock with manual interlock override, to prevent opening of cover when switch is in on position. Interlock must prevent switch from being turned on with cover open. Operating handle must have lock-off means with provisions for three padlocks.
3. Auxiliary Contacts: One normally open and normally closed contact(s) that operate with switch handle operation.

2.05 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in the Local Electrical or Building Codes.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1 and in accordance with the manufacturer published instructions.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

C. Mount top of trim so that the handle of the very top circuit breaker be installed not higher than 6 feet 7 inches above the floor or working platform unless otherwise indicated.

D. When required, install panelboards on cast-in-place concrete equipment base(s).

E. Attach panelboard to vertical finished or structural surface behind panelboard.

F. Mounting panelboards with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in the following subparagraph provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection.

G. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth in normal locations and 1-1/4 inch in depth in damp, wet or dirty locations. Orient steel slotted supports vertically.

H. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

I. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.

J. Install filler plates in unused spaces.

K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

L. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

M. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

N. Comply with NECA 1.

O. Interfaces with Other Work:
   1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

3.03 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Electrical Identification."

B. Circuit Directory:
   1. Provide directory card inside panelboard door, mounted in transparent card holder.
      a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.
   2. Provide computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
      a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.
   3. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Install warning signs complying with requirements in Section 260553 "Electrical Identification" identifying source of remote circuit.

D. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.

E. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.

F. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Electrical Identification".

G. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Electrical Identification".

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Nonconforming Work:
   1. Panelboards will be considered defective if they do not pass tests and inspections.
   2. Remove and replace defective units and retest.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable component to function smoothly and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination".

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
   1. Measure as directed during period of normal system loading.
   2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
   3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
   4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.06 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END SECTION

262726
WIRING DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.
   2. Twist-locking receptacles.
   3. Isolated-ground receptacles.
   4. Hospital-grade receptacles.
   5. Tamper-resistant receptacles.
   6. Weather-resistant receptacles.
   7. Hazardous locations receptacles.
   8. Twist-lock receptacles.
   9. Wall-switch occupancy sensors.
   10. Pendant cord-connector devices.
   11. Floor service outlets, poke-through assemblies and multi-outlet assemblies.

1.03 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.04 SUBMITTALS

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

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.05 INFORMATIONAL SUBMITTALS – PROVIDE AS PART OF THE O& M MANUAL

A. Field quality-control test reports.

B. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with Local Building Codes.

1.07 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.08 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
   2. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
   2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
   3. Leviton Mfg. Company Inc. (Leviton).
   4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.02 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
   1. Back and side wired.
   2. Specification grade, heavy-duty type.
   3. High impact, chemical resistant smooth nylon face.

B. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
   1. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
   2. Back and side wired.
   3. Specification grade, heavy-duty type.
   4. High impact, chemical resistant smooth nylon face.

C. Hospital-Grade, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
   1. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.

D. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
   1. Description: Labeled to comply with CCBC, Ch. 18-27-517, "Health Care Facilities" Article, "Pediatric Locations" Section.
   2. Back and side wired.
   3. Specification grade, heavy-duty type.
   4. High impact, chemical resistant smooth nylon face.

2.03 GFCI RECEPTACLES

A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
   1. Back and side wired.
   2. Specification grade, heavy-duty type.
   3. High impact, chemical resistant smooth nylon face.

2.04 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

A. Wiring Devices for Hazardous (Classified) Locations: Comply with NEMA FB 11 and UL 1010.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Cooper Crouse-Hinds.
      b. EGS/Appleton Electric.
      c. Killark; a division of Hubbell Inc.

2.05 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.

B. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A
   1. Description: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.06 PENDANT CORD-CONNECTOR DEVICES

A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.
   1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
   2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.07 WALL PLATES

A. Single and combination types to match corresponding wiring devices.
   1. Plate-Securing Screws: Metal with head color to match plate finish.
   2. Material for Finished Spaces:
      a. [Steel with white baked enamel, suitable for field painting]
      b. [Smooth, high-impact thermoplastic] [0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel]
      c. [0.04-inch- (1-mm-) thick, brushed brass with factory polymer finish] [0.05-inch- (1.2-mm-) thick, anodized aluminum]
      d. [0.04-inch- (1-mm-) thick steel with chrome-plated finish].
   3. Material for Unfinished Spaces: Galvanized steel.
   4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, while-in-use, die-cast aluminum with lockable cover.

2.08 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Rectangular, die-cast aluminum with satin finish.

D. Power Receptacle: NEMA WD 6 configuration 5-20R, unless otherwise indicated.

E. Voice and Data Communication Outlet: as indicated on Drawings.

2.09 POKE-THROUGH ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hubbell Incorporated; Wiring Device-Kellems.
   2. Pass & Seymour/Legrand; Wiring Devices & Accessories.
   3. Square D/ Schneider Electric.
   4. Thomas & Betts Corporation.
   5. Wiremold Company (The).

B. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
   1. Service Outlet Assembly: As indicated on Drawings.

2. Size: Selected to fit nominal 4-inch (100-mm) cored holes in floor and matched to floor thickness.
3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
4. Closure Plug: Arranged to close unused 4-inch (100-mm) cored openings and reestablish fire rating of floor.
5. .
6. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, 4-pair, Category 6 voice and data communication cables.

2.10 MULTIOUTLET ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hubbell Incorporated; Wiring Device-Kellems.
   2. Wiremold Company (The).

B. Description:
   1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
   2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

C. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

D. Raceway Material: Metal, with manufacturer's standard finish.

E. Multioutlet Harness
   1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
   2. Receptacle Spacing: as indicated on floor plans.

F. Wire: No. 12 AWG, solid, type THHN, number of circuits and wiring as indicated on floor plans. Connecting alternate receptacles.

2.11 FINISHES

A. Color
   1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by CCBC or device listing.
   2. Wiring Devices Connected to Emergency Power System: Red.
   3. Isolated-Ground Receptacles: As specified above, with orange triangle on face.

B. Coordinate with other wiring devices and lighting control wall stations specified under Section 260923 “Lighting Control Devices” unless otherwise indicated or required by CCBC or device listing.

PART 3 EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:
   1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
   2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
   3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
   4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
   1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
   2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
   3. The length of free conductors at outlets for devices shall meet provisions of CCBC, without pigtails.
   4. Existing Conductors:
      a. Cut back and pigtail, or replace all damaged conductors.
      b. Straighten conductors that remain and remove corrosion and foreign matter.
      c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:
   1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
   3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
   4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
   5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
   6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
   7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
   8. Tighten unused terminal screws on the device.
   9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Dimmers:
   1. Install dimmers within terms of their listing.
   2. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust settings of wall mounted occupancy sensors and time switches as required by project specifications or requested by the owner.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 IDENTIFICATION

A. Comply with Section 260553 "Electrical Identification."
   1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
   1. Test Instruments: Use instruments that comply with UL 1436.

2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END SECTION

262816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Fusible switches.
   2. Nonfusible switches.
   3. Molded-case circuit breakers (MCCBs).
   4. Molded-case switches.
   5. Enclosures.

1.03 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.04 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
   1. Enclosure types and details for types other than NEMA 250, Type 1.
   2. Current and voltage ratings.
   3. Short-circuit current ratings (interrupting and withstand, as appropriate).
   4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
   1. Wiring Diagrams: For power, signal, and control wiring.

1.05 INFORMATIONAL SUBMITTALS – PROVIDE AS PART OF THE O& M MANUAL

A. Field quality-control reports.
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

B. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. Include the following:
   1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined by a qualified testing agency, and marked for intended location and application.

C. Comply with Local Building Codes.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
   2. Altitude: Not exceeding 6600 feet (2010 m).

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
   1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
   2. Indicate method of providing temporary electric service.
   3. Do not proceed with interruption of electric service without Owner's written permission.
   4. Comply with NFPA 70E.

1.08 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 PRODUCTS

2.01 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240 or 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 240 or 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 240 or 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
   5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
   6. Lugs: Mechanical type, suitable for number, size, and conductor material.
   7. Service-Rated Switches: Labeled for use as service equipment.

2.02 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240 or 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Six Pole, Single Throw, 240 or 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 240 or 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
   4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
   5. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.03 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

E. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

F. Features and Accessories:
   1. Standard frame sizes, trip ratings, and number of poles.
   2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
   3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
   4. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings,

push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

5. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.04 MOLDED-CASE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   3. Siemens Energy & Automation, Inc.
   4. Square D; a brand of Schneider Electric.

B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.

C. Features and Accessories:
   1. Standard frame sizes and number of poles.
   2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
   3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
   4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
   5. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.

2.05 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
   1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
   2. Outdoor Locations: NEMA 250, Type 3R.
   3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
   4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
   5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
   6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.03 IDENTIFICATION

A. Comply with requirements in Section 260553 "Electrical Identification".

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination".

END SECTION

265613
LIGHT POLES AND STANDARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, Adopted January 1, 2022, and Supplementary Specifications, Adopted January 1, 2025, shall be used for all applicable procedures in this Section.
   1. The method of measurement identified in IDOT's Standard Specifications shall be utilized to record a final quantity amount required to complete the work.
   2. The basis of payment identified in IDOT's Standard Specifications shall be utilized to complete the work.

B. When IDOT Standard Pay Items are listed for work items, IDOT Standard Specifications should be utilized. Section 100 shall govern General Requirements. Materials and construction requirements associated with standard pay items shall take precedence over the work task.

C. Where the IDOT Standard Specifications do not provide enough guidance, the drawings and general provisions of the Contract, including General and Supplementary Conditions and other direction found in this specification section, shall be applied. Any disagreement between IDOT Standard Specifications and the language found in this section shall be brought to the Engineer to provide final direction prior to the start of any work related to this section.

1.02 SUMMARY

A. Section Includes:
   1. Poles and accessories for support of luminaires.

B. Related Requirements:
   1. DECORATIVE LIGHT POLE, TYPE A

1.03 DEFINITIONS

A. EPA: Equivalent projected area.

B. Luminaire: Complete luminaire.

C. Pole: Luminaire-supporting structure, including tower used for large-area illumination.

D. Standard: See "Pole."

1.04 ACTION SUBMITTALS

A. Product Data: For each pole, accessory, and luminaire-supporting and -lowering device, arranged as indicated.
   1. Include data on construction details, profiles, EPA, cable entrances, materials, dimensions, weight, rated design load, and ultimate strength of individual components.
   2. Include finishes for lighting poles and luminaire-supporting devices.
   3. Anchor bolts.
   4. Manufactured pole foundations.

B. Shop Drawings:
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Detail fabrication and assembly of poles and pole accessories.
   4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
   5. Anchor bolt templates keyed to specific poles and certified by manufacturer.
   6. Method and procedure of pole installation. Include manufacturer's written installations.

C. Samples: For each exposed lighting pole, standard, and luminaire-supporting device and for each color and texture specified.

1.05 INFORMATIONAL SUBMITTALS

A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements according to AASHTO LTS-6-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations signed and sealed by a professional engineer.

B. Source quality-control reports.

C. Field quality-control reports.

D. Sample Warranty: Manufacturer's standard warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For poles to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include pole inspection and repair procedures.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Pole repair materials.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for foundation testing.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant skids at least 12 inches (300 mm) above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle poles with web fabric straps.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of pole(s) that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within a specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
   2. Warranty Period for Corrosion Resistance: Five years from date of Substantial Completion.
   3. Warranty Period for Color Retention: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Structural Characteristics: Comply with AASHTO LTS-6-M.

B. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.

C. Live Load: Single load of 500 lbf (2200 N) distributed according to AASHTO LTS-6-M.

D. Ice Load: Load of 3 lbf/sq. ft. (145 Pa), applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.

E. Wind Load: Pressure of wind on pole and luminaire, calculated and applied according to AASHTO LTS-6-M.

1. Basic wind speed for calculating wind load for poles 50 feet (15 m) high or less is 115 mph
    a. Wind Importance Factor: 1.0.
    b. Minimum Design Life: 30 years.
    c. Velocity Conversion Factor: 1.0.

F. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.

G. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

2.02 ALUMINUM POLES

A. Manufacturers: As listed in Schedules on Plans.

B. Poles: Seamless, extruded structural tube complying with ASTM B 221, Alloy 6061-T6, with access handhole in in pole wall.
1. Shape: Round, straight.
2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

C. Arms: Aluminum type, continuously welded to pole attachment plate. Material and finish same as plate.

D. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

E. Grounding and Bonding Lugs: Bolted 1/2-inch (13-mm) threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

F. Fasteners: Stainless steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
1. Materials: Compatible with poles and standards as well as to substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.

G. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches (65 by 130 mm), with cover secured by stainless-steel captive screws. The contractor is required to route/size all conduit and conductors and locate and size handholes.

H. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
    a. Color: As selected by Architect from manufacturer's full range.

I. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.

2. Powder coat shall comply with AAMA 2604.
    a. Electrostatic applied powder coating; single application with a minimum 2.5- to 3.5-mils dry film thickness; cured according to manufacturer's instructions. Coat interior and exterior of pole for equal corrosion protection.
    b. Color: As selected by Architect from manufacturer's full range.

2.03 POLE ACCESSORIES

A. Duplex Receptacle: Ground-fault circuit interrupter type, 120 V ac, 20 A in a weatherproof assembly. Comply with requirements in Section 262726 "Wiring Devices."
    1. Recessed 180 inches above finished grade.
        a. NEMA 250, Type 3R, nonmetallic polycarbonate plastic or reinforced fiberglass, enclosure with cover; color to match pole.
        b. Lockable hasp and latch complying with OSHA lockout and tag-out requirements.

B. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.

C. Decorative accessories, supplied by decorative pole manufacturer, include the following:
    1. Banner Arms: As listed in Fixture Schedule.
    2. Flag Holders: As listed in Fixture Schedule.
    3. No after-market banners.

D. Fuses: Provide in-line fuses in base of poles for lighting and receptacle circuits.

2.04 MOUNTING HARDWARE

A. Anchor Bolts: Manufactured to ASTM F 1554, Grade 55, with a minimum yield strength of 55,000 psi (380,000 kPa).
    1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C.
    2. Headed rods.
    3. Threading: Uniform National Coarse, Class 2A.

B. Nuts: ASTM A 563, Grade A, Heavy-Hex
    1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C.
    2. Two nuts provided per anchor bolt, shipped with nuts pre-assembled to the anchor bolts.

C. Washers: ASTM F 436, Type 1.
    1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C.
    2. One washers provided per anchor bolt.

2.05 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine poles, luminaire-mounting devices, lowering devices, and pole accessories before installation. Components that are scratched, dented, marred, wet, moisture damaged, or visibly damaged are considered defective.

C. Examine roughing-in for foundation and conduit to verify actual locations of installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 POLE FOUNDATION

A. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123 M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete." base pole foundation shall be confirmed by structural engineer retained by manufacturer.

B. Anchor Bolts: Install plumb using manufacturer-supplied steel template, uniformly spaced.

C. Contractor shall coordinate exact width and depth of foundation with manufacturer and site conditions.

D. Base pole foundation dimensions reinforcement concrete type and detailing shall be obtained from civil or structural engineer assigned to this project. Pole foundation must follow the geotechincal report and the applicable wind forces applied. As specified in the spec section 265619 (led exterior lighting)

3.03 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on drawing.
1. Fire Hydrants and Water Piping: 60 inches (1520 mm).
2. Water, Gas, Electric, Communications, and Sewer Lines: 5 feet.
3. Trees: 15 feet (5 m) from tree trunk.

C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."

D. Install poles per Architect and Engineer details.

E. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

3.04 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum using insulating fittings or treatment.

B. Steel Conduits: Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

3.05 GROUNDING

A. Ground Metal Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
1. Install grounding electrode for each pole unless otherwise indicated.

3.06 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.07 FIELD QUALITY CONTROL

A. Perform the following special inspections:
1. Inspect poles for nicks, mars, dents, scratches, and other damage.

PART 4 METHOD OF MEASUREMENT & BASIS OF PAYMENT

A. Light Poles shall be measured as each for pole installed. See special provision DECORATIVE LIGHT POLE, TYPE A, for more information.

END SECTION

265619
LED EXTERIOR LIGHTING

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. Luminaire types.
   2. Materials.
   3. Finishes.
   4. Luminaire support components.

B. Related Requirements:
   1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
   2. Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.
   3. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

1.03 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lamp: a self-contained LED replacement lamp, that screws into decorative fixtures

F. LED: Light-emitting diode.

G. LED Module: assembly of LED’s on a circuit board; typically the LED replacement unit within a fixture.

H. Lumen: Measured output of lamp and luminaire, or both.

I. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.
   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of luminaire.
   4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
   5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.
      a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
      b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
   6. Wiring diagrams for power, control, and signal wiring.

7. Photoelectric relays.
8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.
1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Sustainable Design Submittals:
1. BUG Ratings: Product Data indicating BUG ratings of all installed exterior luminaires
2. Product Data: Indicating if luminaire is certified by ENERGY STAR or Design Lights Consortium.

D. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content and rated lamp life, showing compliance with specified requirements. [as required]
1. Include BUG rating information
2. Include DLC listing status
3. Include DOE “Lighting Facts” information
4. Include Efficacy information

E. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

F. Delegated-Design Submittal: For luminaire supports.
1. Include design calculations for luminaire supports.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.
3. Provide a list of all acceptable cleaning solutions.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least two (2) of each type.
2. LED Modules: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
4. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
5. Drivers: One for every 100 of each type and rating installed. Furnish at least one of each type.
6. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.07 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:
1. Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

D. Mockups: For exterior luminaires, complete with power and control connections.
1. Obtain Architect's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.09 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.10 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Structural failures, including luminaire support components.
   b. Faulty operation of luminaires and accessories.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: 5 years from date of Substantial Completion.
3. Additional coverage: warranty shall cover LEDs, drivers, and color shift over time.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Provide for proper recycling or disposal of existing lamps and ballasts removed from the site in accordance with EPA and State of Illinois regulations.

PART 2 PRODUCTS

2.01 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the Chicago Electrical Code, by a qualified testing agency, and marked for intended location and application.

B. Comply with local building and electrical codes.

C. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

D. Field selectable dip switches are not allowed.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. Source Limitations:
1. Obtain luminaires from single source from a single manufacturer and platform.
2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

G. For any substitutions, contractor shall follow the Substitution request protocol and provide the filled-out substitution form along with photometrics in accordance with Primera photometric calculations standards.

2.02 LUMINAIRE SPECIFIC REQUIREMENTS

A. Refer to completed fixture schedule on Drawings for the following information:
   1. Operating Voltage
   2. Lamping information
   3. CCT required, as per plans
   4. Minimum CRI, 80
   5. UL Listing requirements for damp locations, wet locations, hazardous locations, or others.
   6. Housing IP rating requirements
   7. Mounting type
   8. Photometric distribution type
   9. Finishes

B. Dimming luminaires shall be dimmable from 100% to 5% (maximum minimum threshold) of maximum light output.

C. Drivers shall be integral, unless noted otherwise in the fixture schedule.
   1. Drivers shall be compatible with selected advanced digital lighting control system.

D. Heat sinks shall be integral, and not visible as part of the final installation.

E. LEDs and drivers shall have a minimum rate life of 50,000 hours.

F. Provide with integral mounting provisions or universal mounting bracket.

G. Provide with integral junction box with conduit fittings.

H. All luminaires shall be UL listed, Comply with UL 1598, and listed for wet location.

I. Lamp base complying with ANSI C81.61 or IEC 60061-1.

J. Bulb shape complying with ANSI C79.1.

K. L70 lamp life of 50,000 hours or greater.

L. In-line Fusing: Separate in-line fuse for each luminaire

M. Lamp Rating: Lamp marked for outdoor use.

N. All luminaires, and associated components shall be rated for the environment that they are installed in for both startup and running operation, including but not limited to ingress protection rating, and high and low temperature environment.

2.03 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum or Stainless steel. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit maintenance. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:
   1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   2. Glass: Annealed crystal glass unless otherwise indicated.
   3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
   1. White Surfaces: 85 percent.
   2. Specular Surfaces: 83 percent.
   3. Diffusing Specular Surfaces: 75 percent.

G. Housings:
   1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
   2. Provide filter/breather for enclosed luminaires.

H. LED Housings:
   a. Extruded-aluminum housing and heat sink.
   b. Clear anodized, or powder-coat painted finish. Refer to schedules.

I. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   1. Label shall include the following lamp characteristics:
      a. "USE ONLY" and include specific lamp type.
      b. Lamp diameter, shape, size, wattage and coating.
      c. CCT and CRI for all luminaires.

2.04 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
   3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
   4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
      a. Color: as indicated on plans.

D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
   2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
      a. Color:

1) As selected from manufacturer's standard catalog of colors.
2) As indicated in fixture schedule

2.05 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. All supports and mounting shall withstand the environment conditions that the lighting fixtures are installed in; no loose parts or swaying of fixtures is acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, canopy ceilings, and overhang ceilings for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TEMPORARY LIGHTING

DESCRIPTION OF TEMPORARY UTILITY SYSTEMS

A. Lighting:
1. Provide temporary lighting for:
   a. Construction needs.
   b. Safety and Security lighting.
2. Safety and Security lighting:
   a. Within the buildings, illuminate all stairways, corridors and entrances on a 24 hour per day basis.
   b. Outside the building(s) provide:
      1) An illuminated route from site entrance to project area for security guard or emergency access.
      2) Site lighting controlled by photoelectric cell.
      3) Illumination of all main electrical switching equipment, other equipment for which emergency access is specified.
3. Basic requirements, all lighting:
   a. Lamps:
      1) Covered with safety guard or deeply recessed in reflector.
      2) Not suspended by their electric cords unless cord and fixture de-signed for that purpose.
4. Contractors or subcontractors who require lighting in excess of that specified: Make arrangements with Electrical Contractor and pay all costs thereof.

3.03 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Fasten luminaire to structural support.

C. Supports:
1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

D. Wall-Mounted Luminaire Support:
   1. Attached to structural members in walls or Attached to a minimum 1/8 inch (3 mm) backing plate attached to wall structural members

E. Wiring Method: Install cables in raceways. Conceal raceways and cables.

F. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.

G. Coordinate layout and installation of luminaires with other construction.

H. Adjust luminaires that require field adjustment or aiming.

I. Comply with requirements in Section 260519 "Conductors and Cables" and Section 260533 "Raceways and Boxes" for wiring connections and wiring methods.

3.04 INSTALLATION OF BOLLARD LUMINAIRES

A. Align units for optimum directional alignment of light distribution, or as indicated on plans.
   1. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at luminaire location. Cast conduit into base and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete".

3.05 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

A. Aim as indicated on Drawings.

3.06 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes". In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.07 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Electrical Identification".

3.08 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections:
   1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
   2. Verify operation of photoelectric controls.

C. Luminaire will be considered defective if it does not pass tests and inspections.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.09 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires.

3.10 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
   1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
   2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   3. Adjust the aim of luminaires in the presence of the Architect and Lighting Designer.

3.11 METHOD OF MEASUREMENT

A. Field Tests and Inspections of Power and Lighting Installations
   - Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections and light levels measurement of installed light fixtures.
   - Administer and perform tests and inspections with assistance of factory-authorized service representative.
   - After installing the lighting system and after electrical circuits have been energized, perform proof-of-performance field measurements and analysis for compliance with requirements. Use calibrated light meter to measure light levels to comply with the construction documentation, per IES standards. Make field measurements at established test points in areas of concern for spill light and glare.
   - Perform analysis to demonstrate correlation of field measurements with specified illumination quality and quantity values and corresponding computer-generated values that were submitted with engineered design documents. Submit a report of the analysis. For computer-generated values, use manufacturer's lamp lumens that are adjusted to lamp age at time of field testing.
   - Report results in writing.

B. Nonconforming Work:
   - Lighting will be considered defective if it does not pass tests and inspections.
   - Remove and replace defective units and retest.

C. Correction of Illumination Deficiencies:
   - Make corrections to illumination quality or quantity, measured in field quality-control tests, that varies from specified illumination criteria by plus or minus 10 percent.
   - Add or replace luminaires; change mounting height and aiming; or install louvers, shields, or baffles.
   - If luminaires are added or mounting height is changed, revise aiming and recalculate and modify or replace support structures if indicated.
   - Do not replace luminaires with units of higher or lower wattage without Architect's approval.
   - Retest as specified above after repairs, adjustments, or replacements are made.
   - Report results in writing.

D. Correction of Excessive Illumination in Spill-Light-Critical Areas:
   - If measurements indicate that specified limits for spill light are exceeded, make corrections to illumination quantity, measured in field quality-control tests, that reduce levels to within specified maximum values.
   - Replace luminaires; change mounting heights and revise aiming; or install louvers, shields, or baffles.
   - Obtain Architect's approval to replace luminaires with units of higher or lower wattage.
   - If mounting height is changed, revise aiming and recalculate and modify or replace support structures if indicated.
   - Retest as specified above after repairs, adjustments, or replacements are made.
   - Assemble and submit test and inspection reports.
   - Manufacturer Services: Engage factory-authorized service representative to support field tests and inspections.
   - Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

END SECTION

311000
SITE CLEARING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Responsible for all work in this section.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
   1. Protecting existing vegetation to remain.
   2. Removing existing vegetation.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Stripping and stockpiling rock.
   6. Removing above- and below-grade site improvements.
   7. Disconnecting, capping or sealing, and abandoning site utilities in place.
   8. Temporary erosion and sedimentation control.

1.04 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.06 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain owner property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.07 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or video recordings.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Topsoil stripping and stockpiling program.

C. Rock stockpiling program.

D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

E. Burning: Documentation of compliance with burning requirements and permitting of authorities having jurisdiction. Identify location(s) and conditions under which burning will be performed.

1.08 QUALITY ASSURANCE

A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.09 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed trafficways if required byowner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining owner's property will be obtained by owner before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on owner's premises in location directed by the owner

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 PRODUCTS

2.01 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.

C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable toowner.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3.03 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

3.04 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
   1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removedor abandoned in place.
   1. Arrange with utility companies to shut off indicated utilities.
   2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied bythe owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.

E. Excavate for and remove underground utilities indicated to be removed.

F. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024119 "Selective Demolition."

3.05 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
   3. Use only hand methods or air spade for grubbing within protection zones.
   4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm) and compact each layer to a density equal to adjacent original ground.

3.06 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   1. Limit height of topsoil stockpiles to 72 inches.
   2. Do not stockpile topsoil within protection zones.
   3. Retain one of two subparagraphs below to suit Project.
   4. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
   5. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.07 STOCKPILING ROCK

A. Remove from construction area naturally formed rocks that measure more than 1 foot across in least dimension. Do not include excavated or crushed rock.
   1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

B. Stockpile rock without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
   1. Limit height of rock stockpiles to 36 inches.
   2. Do not stockpile rock within protection zones.
   3. Retain one of two subparagraphs below to suit Project.
   4. Dispose of surplus rock. Surplus rock is that which exceeds quantity indicated to be stockpiled or reused.
   5. Stockpile surplus rock to allow later use by the owner.

3.08 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off owner's property.

B. Burning tree, shrub, and other vegetation waste is permitted according to burning requirements and permitting of authorities having jurisdiction. Control such burning to produce the least smoke or air pollutants and minimum annoyance to surrounding properties. Burning of other waste and debris is prohibited.

C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END SECTION

312000
EARTH MOVING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Excavating, backfilling, and compaction of subgrade soils for hardscape areas (such as paving, roads and parking areas). Meet all compaction requirements for subgrade prep as specified. Within areas designated to be hardscape leave the top of subgrade at an elevation equal to the bottom of the aggregate stone base.
      b. Excavating, backfilling, and compaction of subgrade soils, bedding materials, initial backfill, and trench backfill for site structures and utilities. Meet all compaction requirements as specified.
      c. Excavating, backfilling, and compaction for landscaped areas. Meet all compaction requirements for subgrade prep as specified. Within areas designated to be landscape leave the top of subgrade at an elevation equal to the bottom of the landscaping depth section.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 RELATED WORK

A. Section 312318.11 – Clean Construction or Demolition Debris Disposal

B. Section 312318.13 – Contaminated Soil General Construction Demolition Debris Disposal

C. Section 314100 – Acceptance of Backfill

1.04 REFERENCES

A. ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/cu ft) (600 kN-m/cu m)).

C. ASTM D1556 - Density of Soil in place by Sand-Cone Method

D. ASTM D1557 - Tests for Moisture-Density Relationship of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop (Modified Proctor).

E. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

F. ASTM D2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System.

G. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

H. ASTM D3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

I. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

J. 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and Appendix B., Section 742, Table A.; Tiered Approach To Corrective Action Objectives (Taco): 35 Ill .Adm. Code 742.

K. Standard Specifications for Water and Sewer Main Construction in Illinois (SSWSMCI), 6th edition 2009.

L. Illinois Department of Transportation (IDOT):
1. IDOT Standard Specifications for Road and Bridge Construction (dated January 2012) including all addenda.

1.05 SUBMITTALS

A. Submit 10 lb. sample of each type of proposed fill to Construction Manager's designated testing agency, in separate airtight containers.

B. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer approval. Certify aggregates meet or exceed special requirements.

1.06 QUALITY ASSURANCE

A. Furnish each material from single source throughout the work, unless change of source is approved by Construction Manager.

1.07 EXISTING FIELD CONDITIONS

A. The Contractor shall visit the site before bidding and satisfy himself as to the condition and characteristics of site traffic, means of access, and any other features which may influence the cost of the Work.

B. The Contractor shall accept conditions at the site of the work as found and shall assume the risk of any variation of the condition of site which may occur subsequent tosigning of the Contract. The Contractor shall assume the risk of encountering obstacles and the Contract price shall include the cost of removal of unforeseen obstacles including boulders, rubbish, underground pipes and conduits, trees, roots, timber, masonry structures, pavements, etc., whether or not these obstacles are shown on the Plans.

C. The contract documents have been prepared to show existing underground pipes, conduits, and structures, however, it shall be anticipated that undocumented facilities not shown on the plans may be encountered. The Contractor shall include in the work under the contract cautious excavation to avoid damage to existing facilities. Any damage to existing facilities shall be repaired by the Contractor at no additional cost to theowner and as directed by the Architect/Engineer.

1.08 PROTECTION

A. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods or prevent cave-in or loose soil from falling into excavation.

B. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

C. Notify Engineer immediately of unexpected subsurface conditions. Confirm notification in writing. Discontinue work until Architect issues written notification to resume work.

D. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.

E. Grade excavation to perimeter to prevent surface water runoff into excavation.

PART 2 PRODUCTS

2.01 MATERIALS – GENERAL

A. In accordance with the Geotechnical Data the Construction Manager's testing agency representative shall determine if excavated material is suitable for backfill. Suitable excavated material may be used for backfill.

B. Provide all fill or backfill materials from off site in accordance with Section 314100 "Acceptance of Backfill."

C. Tests and analysis of soil material will be performed in accordance with ASTM C136, ASTM D1557 and ASTM D2487.

D. When tests indicate materials do not meet specified requirements, change material and retest at no cost to owner.

2.02 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1 (“IDOT CA-7”): Free draining coarse stone, crushed gravel; Angular crushed natural stone; free of shale, clay, friable material and debris; graded in accordance with ASTM C136, within the following limits and shall meet the physical requirements for Coarse Aggregate (Class B), Grade CA-7, of Section 1004 of the IDOT Specifications:

Sieve Size	Percent Passing
1-1/2 inches (38 mm)	100
1 inch (25 mm)	90 to 100
1/2 inch (13 mm)	30 to 60
No. 4 (4.75 mm)	0 to 10

B. Coarse Aggregate Type A2 (“IDOT CA-6”): Coarse stone or gravel, angular crushed natural stone; free of shale, friable material and debris; graded in accordance with ASTM C136, within the following limits and meet the physical requirements for Coarse Aggregate (Class B), Grade CA-6 of Section 1004 of the IDOT Specifications:

Sieve Size	Percent Passing
1-1/2 inches (38 mm)	100
1 inch (25 mm)	90 to 100
1/2 inch (13 mm)	60 to 90
No. 4 (4.75 mm)	30 to 56
No. 16 (1.18 mm)	10 to 40
No. 200 (75 micro m)	4 to 12

C. Coarse Aggregate Type A3 (“IDOT CA-1”): Free draining coarse stone, crushed gravel; Angular crushed natural stone; free of shale, clay, friable material and debris; graded in accordance with ASTM C136, within the following limits and shall meet the physical requirements for Coarse Aggregate (Class B), Grade CA-1, of Section 1004 of the IDOT Specifications:

Sieve Size	Percent Passing
3 inches (75 mm)	100
2-1/2 inches (63 mm)	90 to 100
2 inches (50 mm)	45 to 75
1-1/2 inches (37.5 mm)	0 to 30
1 inch (25 mm)	0 to 6
Pan	

2.03 CLAY FILL MATERIAL

A. Subsoil Type S2 ("Clay Fill"):
   1. Cohesive soil material, either excavated on-site and re-used, or imported borrow.
   2. Well-graded. Free of lumps larger than 3 inch (75 mm), rocks larger than 2 inch (50 mm), and debris.
   3. Conforming to ASTM D2487 Group Symbol CL.

PART 3 EXECUTION

3.01 PREPARATION

A. Notify affected utility companies before starting work, including contacting DIGGER (312-744-7000) and comply with their requirements. Mark location of all existing underground utilities. Utilities to remain shall be protected from damage. The Contractor shall assume all responsibility for coordinating this Work with the utility companies involved at no additional cost to the owner.

B. Verify and confirm in writing that areas to be backfilled are free of debris, snow, ice or water, and surfaces are not frozen.

C. Verify that survey bench marks and intended elevations for the Work are as indicated. Identify required lines, levels, contours, and datum locations.

D. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs to remain from excavating equipment and vehicular traffic.

F. Before excavating, protect adjacent structures that may be damaged by excavating.

G. Before backfilling, verify that all code-required inspections or tests have been performed.

H. Before backfilling, verify that all underground utility locations have been recorded.

I. Before backfilling, verify that subgrade soils have been inspected and approved by Construction Manager's representative.

J. Before backfilling building elements, verify that any required foundation perimeter drainage installation has been inspected and approved in writing by Construction Manager's representative.

K. Before backfilling, verify that backfill materials have been approved for use by Construction Manager's representative.

3.02 EXCAVATING

A. Strip topsoil to full depth of topsoil in designated areas. Stockpile on site in locations approved by Construction Manager.

B. Strip topsoil to full depth of topsoil in designated areas. Stockpile on site in locations approved by Construction

C. Excavate site soils to accommodate building elements, slabs-on-grade, paving, site structures, utilities, landscaping, and construction operations.

D. Slope banks of excavation to angle of repose or less until shored. Sides, walls or faces of all trenches shall be sloped and maintained in a safe manner and in the required condition until completion of backfilling. Excavations shall be braced or sloped in compliance to the latest Occupational Safety and Health Administration (OSHA) requirements or as instructed by the testing agency on-site representative.

E. Do not interfere with 45 degree bearing splay of existing foundations.

F. Grade top perimeter of excavation to prevent surface water from draining into excavation.

G. Trim excavation. Remove loose matter.

H. Notify Construction Manager of unexpected subsurface conditions.

I. Remove unsuitable material as determined by the Construction Manager's Testing Agency in accordance with Section 00 31 32 – Geotechnical Data.

J. Repair or replace items indicated to remain which are damaged by excavation.

3.03 STOCKPILING

A. Stockpile materials on site at locations approved by the Construction Manager.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing. Prevent intermixing or contamination of soil types.

D. Direct surface water away from stockpile site(S) to prevent erosion or deterioration of materials.

E. Stockpile soil material to a maximum height of 8 feet.

3.04 DEWATERING

A. Provide and maintain at all times during construction ample means and devices for removing and properly disposing of water entering the excavations of all parts of the work until all work has been completed.

B. Dispose of water pumped or drained from the work in a manner satisfactory tothe owner and in accordance with all applicable regulations without damage to adjacent property or to other work under construction.

3.05 PROOF ROLLING

A. Proof Roll entire area under building and pavements with a pneumatic roller or heavily loaded dump truck (minimum 25 tons).

B. Make at least two (2) passes (second at right angle to first) in the presence of a representative of the owner's testing service.

C. Excavate unsatisfactory soil materials encountered to the additional depth established by the owner's testing service and approved by the Construction Manager.

3.06 BACKFILLING

A. Place backfill and fill materials to required grades in layers not more than 8" in loose depth for materials compacted by heavy compaction equipment, and not more than 4" in loose depth for materials compacted by hand operated tampers. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content of the soil material.

B. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

C. Support pipes, and conduits during placement and compaction of bedding fill.

D. Place fill materials in continuous layers before compacting.

E. Use a placement method that will not disturb or damage utilities in trenches.

F. Place backfill and fill materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

G. Maintain optimum moisture content of backfill materials, determined by laboratory analysis, in order to obtain specified compaction density.

3.07 COMPACTION

A. General: Provide and control compaction of subgrade, fill and backfill material during construction, providing the minimum percentage of density specified.

B. Percentage of Maximum Density Requirements: Provide not less than the following percentages of maximum density of fill or backfill material as determined by ASTM D1557:
   1. Compact surface of subgrade to 95% maximum density.
   2. Compact each layer of backfill or fill material to 95% maximum density.

C. Moisture Control:

1. Compact subgrade, fill or backfill material at within 2% plus-or-minus of its optimum moisture content as determined by ASTM D1557.
2. Where the material must be moisture conditioned before compaction, uniformly apply water to the surface of material, to prevent free water appearing on the surface during or subsequent to compaction operations.
3. Remove and replace, to scarify and air dry, material that is too wet to allow compaction to required density.

3.08 PROTECTION

A. Protect structures, foundations, utilities, slabs and other facilities both within and outside the project limits from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation. Use temporary excavation protection measures if necessary.

B. Protect basements, vaults, tanks, or other below ground structures where buoyancy or floor failures can occur due to uplift from storm water or ground water or leaks from adjacent structures.

C. Where structures are to be constructed below the ground water table, pumps, well points, cofferdams or other acceptable methods shall be used to permit construction of structures under dry conditions. Dry conditions shall prevail until any concrete has reached sufficient strength to withstand earth and hydrostatic loads and until the structures are properly jointed, tested and backfilled. Protect excavation from flooding until all structures up to final grade level are in place and backfilled. Water level shall be maintained below top of backfill at all times.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. The Contractor shall provide all fence, barricades, lights, and other protective devices necessary and as directed by the Construction Manager to secure the excavation site from all unauthorized personnel or trespassers, and shall maintain same for the full period of the work.

3.09 TEMPORARY EXCAVATION PROTECTION MEASURES

A. The Contractor shall install temporary protective measures, including, but not limited to: sheeting, tie-back sheeting, shoring, underpinning, timbering, bracing, or piling as required so that the excavation can proceed in a safe and efficient manner and to protect existing structures or utilities. Temporary protective measures shall meet the requirements of Occupational Safety and Health Administration and governing codes.

B. Before starting excavation, the Contractor shall submit, complete design calculations and drawings of required sheeting, bracing, shoring, or underpinning systems to be used which have been prepared, signed, and sealed by a Structural Engineer licensed in the State of Illinois that has been hired by the Contractor. The Contractor shall also submit proposed noise control and vibration control measures.

C. Drawings shall show how sheeting, bracing, shoring, or underpinning shall be provided, including dimensions of members and proposed methods for fastening or securing components.

D. The Contractor shall survey and document existing conditions and structures both within and outside the project limits by videotape, photograph, or other means of documentation.

E. The Contractor shall perform all field survey work necessary to determine type, size, depth, and locations of buried and non-buried structures, foundations, and utilities that require protection during installation. Any disturbance or damage to existing structures, foundations, utilities or other property both within and outside the project limits, caused by the Contractor's operation, shall be repaired by the Contractor in a manner satisfactory to the Architect/Engineer and at no additional cost to the owner.

F. The sole responsibility for the design, methods of installation, safety, and adequacy of the temporary protective measures and protection of existing structures and utilities shall remain that of the Contractor.

G. Used material shall be in good condition, not damaged or excessively pitted. All steel or wood sheeting designated to remain in place shall be new. New or used sheeting may be used for temporary work.

H. Steel sheet piling shall be manufactured from steel conforming to ASTM A328. Steel for soldier piles, wales, and braces shall be new or used and shall conform to ASTM A36. All timber used for breast boards (lagging) shall be new or used, meeting the requirements for Douglas Fir Dense Construction grade with a bending strength not less than 1500 psi or Southern Pine No. 2 Dense.

I. The Contractor shall establish and locate all lines and levels and be responsible for the correct construction layout of all temporary protection measures.

J. The Contractor shall take extra care and coordinate with the existing utilities for working height clearances where the work is required to be performed under or near an energized transmission or distribution line.

K. The Contractor shall use installation and construction means and methods that will not cause damage to existing structures, foundations, utilities, or paving both within and outside the project limits, especially due to vibration or settlement. Pushing, drilling, or other low vibration methods shall be used if necessitated by soil conditions or existing adjacent structures both within and outside the property limits.

L. The Contractor shall provide monitoring for existing structures and utilities both within and outside the project limits at no additional cost to the owner. The Contractor shall employ a testing agency experienced in monitoring movement settlement, vibration, and noise levels. The Contractor shall ensure that vibration movement and settlement are within acceptable limits to prevent damage to existing structures and utilities and that noise levels are within acceptable limits.

M. If at any time the safety of any adjacent structures, streets, or utilities appears to be endangered, Contractor shall cease operations, notify the Construction Manager, take all proper means to support such structures, and not resume operations until corrective means have been approved by the Architect/Engineer and completed.

N. When work is complete, temporary protective measures may be left in place unless otherwise directed by the Construction Manager and/or the owner. Temporary protective measures shall be removed to at least 3 feet below finished grade, unless otherwise noted. Vacancies left by the temporary protective measures shall be backfilled with structural fill and compacted.

3.010 FIELD QUALITY CONTROL

A. Construction Manager will engage a qualified independent testing agency to sample materials, perform tests, and submit test reports during earthwork operations.

B. Quality Control Testing During Construction:
   1. The Construction Manager's testing agency must inspect and approve subgrade soil surfaces and fill layers before further construction work is performed thereon.
   2. The Construction Manager’s testing agency shall perform field and laboratory density tests in accordance with either ASTM D 1556 (sand cone method) and ASTM D 1557 as applicable.
   3. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922. The calibration curves shall be periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, the calibration curves furnished with the moisture gauges shall be checked in accordance with ASTM D 3017.
   4. If field tests are performed using nuclear methods, the inspection and testing agency shall make calibration checks on both density and moisture gauges at beginning of work, on each different type of material encountered, and at intervals as specified by the equipment manufacturer.

5. If, in the opinion on the Construction Manager's testing agency representative, based on the inspection and testing agency reports and inspections, subgrade or fills have not been placed to specified density, the Contractor shall perform additional compaction and retesting until specified density is achieved. Contractor to pay for all retesting work.

C. Contractor's Responsibilities
1. Notify owner sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.
2. Coordinate with owner's and Construction Manager's personnel; provide access to Work.
3. Provide representative samples of materials to be tested, in required quantities.
4. Assist the Construction Manager's testing agency by providing access to the excavation and fill areas, and by removing loose materials from compacted soil layers prior to testing.

D. Tests for Proposed Soil Materials:
1. Provide one optimum moisture-maximum density curve for each type of fill or backfill. Determine maximum densities in accordance with ASTM D 1557.
2. Determine the suitability of materials to be used as fill and backfill.

E. Required Compaction Testing Frequency:
1. Construction Manager's testing agency will inspect, test, and approve each lift of fill and backfill before next lift is placed.
2. Take a field density test for each 1,000 sq. ft. of backfill and fill under building elements.
3. Take a field density test for each 2,000 sq. ft. of backfill and fill under hardscape.
4. Take a field density test at 50 foot intervals along linear trench backfill under building elements or hardscape.
5. Take a field density test for each 4,000 sq. ft. of backfill and fill underlandscape areas.

3.011 MAINTENANCE AND RESTORATION

A. Restoration: Restore all areas affected by construction both on and offowner's property to original condition.

3.012 HANDLING AND DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Burning is not permitted on the owner's property.

B. Remove waste materials, excess materials, and excavated materials classified as unsatisfactory from the project site and properly dispose of offsite.

END OF SECTION

312318.11
CLEAN CONSTRUCTION OR DEMOLITION DEBRIS DISPOSAL

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a.

B. Alternate Bids: N/A

C. Unit Prices: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 APPLICABILITY:

A. This section applies for all demolition, construction and renovation projects that require removal and off-site transfer of Clean Construction or Demolition Debris (CCDD) and Uncontaminated soil as defined in this Specification.

1.04 INTRODUCTION

A. Work Included: This specification is for the excavation, loading and off-site transfer of CCDD and Uncontaminated soil. Locations of CCDD and Uncontaminated soil on the project site shall be determined by the owner's Representative. The Contractor shall perform the work in accordance with all applicable local, county, state, and federal regulations. The work shall include the following:
   1. CCDD:
      a. All CCDD shall be taken to a permitted CCDD fill site. Uncontaminated asphalt, concrete and/or brick that are free of other soil/fill or debris shall be taken to approved recycling facilities for recycling. The Contractor shall test for locations of CCDD.
      b. At, or prior to, the Contractor's environmental briefing meeting with the owner's Representative, the Contractor shall identify the selected CCDD fill site and/or recycling facility. Once identified in the formal submittals required in Subsection 1.5, the Contractor may not change the CCDD fill site or recycling facility without written authorization from owner's Representative.
      c. At, or prior to, the Contractor's environmental briefing meeting with the owner's Representative, the Contractor shall identify the hauler or haulers to be used for the transportation of CCDD. Once identified in the formal submittals required in Subsection 1.5, the Contractor may not change the haulers without written authorization from the owner's Representative.
      d. At least 48 hours prior to commencing any excavation activities, the Contractor shall contact the owner's Representative for field oversight and documentation of CCDD removal and disposal.
      e. The Contractor shall excavate, load, and transport of identified CCDD to the identified CCDD fill site or recycling facility.
      f. The Contractor shall provide copies of CCDD fill site receipts to the owner's Representative. The fill site receipts shall be per-truck, and shall be legible. The receipts must include the date and time of transfer, the name of the hauler, the receiving fill site, and the volume of CCDD material transferred per truck. The Contractor shall also provide a Daily Report to the owner's Representative. The Daily Report shall include, at a minimum, the name of hauler, the name of the receiving fill site, and the volume of CCDD disposed of or recycled that day. The fill site receipts shall be attached to the Daily Report.
   2. Uncontaminated Soil

a. Unless otherwise approved by owner's Representative, loads of Uncontaminated Soil that are transferred off-site shall be taken to a permitted CCDD facility. The Contractor shall review Contract Documents for locations of Uncontaminated Soils, at the project site, as determined by the owner's Representative.
b. Prior to the transfer of any Uncontaminated Soil off-site, the Contractor shall receive, from the owner's Representative, either an executed copy of a Source Site Certification (IEPA form LPC-662), or an Uncontaminated Soil Certification by a Licensed Professional Engineer (IEPA form LPC-663) with supporting documentation to secure acceptance from the permitted CCDD facility. LPC-662 is required for any soil that is presumed uncontaminated because it is from an area that has never been developed as industrial or commercial. LPC-663 is necessary for all other Uncontaminated Soils transferred off-site. The Licensed Professional Engineer ("LPE") shall be retained by the owner.
c. At, or prior to, the Contractor's environmental briefing meeting with the owner's Representative, the Contractor shall identify the selected CCDD fill site to receive the Uncontaminated Soil. Once identified in the formal submittals required in Subsection 1.5, the Contractor may not change the CCDD fill site without written authorization from the owner.
d. At, or prior to, the Contractor's environmental briefing meeting with the owner's Representative, the Contractor shall identify the hauler or haulers to be used for the transportation of Uncontaminated Soils to the selected fill site. Once identified in the formal submittals required in Subsection 1.5, the Contractor may not change the haulers without written authorization from owner's Representative.
e. At least 48 hours prior to commencing any excavation activities, the Contractor shall contact the owner's Representative for field oversight and screening of the excavated materials. The owner's Representative will document location and depth of excavated materials and screen Uncontaminated Soils loaded into hauling trucks prior to leaving the project site.
f. The Contractor shall excavate, load and transport the identified Uncontaminated Soil to the selected CCDD fill site.
g. The Contractor shall provide copies of CCDD fill site receipts to the owner's Representative. The fill site receipts shall be per-truck and shall be legible. The receipts must include the date and time of transfer, the name of the hauler, the name of the receiving fill site, and the volume of Uncontaminated Soil transferred per truck. The Contractor shall also provide a Daily Report to the owner's Representative. The Daily Report shall include, at a minimum, the name of hauler(s), the name of the receiving fill site(s), and the volume of Uncontaminated Soil transferred that day. The fill site receipts shall be attached to the Daily Report.

3. The Contractor shall attend the environmental briefing meeting conducted by the owner's Representative as scheduled.

B. Related Work:
1. Section 312000 – Earth Moving
2. Section 314000 – Excavating, Backfilling, and Compacting for Utilities
3. Section 312318.13 – Contaminated Soil, General Construction & Demolition Debris Disposal

1.05 DEFINITIONS

A. Clean Construction or Demolition Debris (CCDD) means any of the following materials, alone or in combination, that (i) have been generated from construction or demolition activities and (ii) are *uncontaminated*:
1. broken concrete without protruding metal bars,
2. bricks,
3. rock,
4. stone,

5. reclaimed or other asphalt pavement

B. Uncontaminated soil which is comingled with any of the above materials is also considered CCDD.

C. Owner's Representative means the person designated as the official representative of the owner in connection with a project.

D. IEPA means Illinois Environmental Protection Agency.

E. LPE means licensed professional engineer.

F. MWRD: Metropolitan Water Reclamation District.

G. OSHA means the federal agency with responsibility for worker safety, the Occupational Safety and Health Administration.

H. Soil means any granular or cohesive materials designated for removal as specified in the Architect/Engineer drawings and specifications and includes soils and soil-like materials, such as clay, that are determined to be Uncontaminated Soil, Contaminated Soil, and Special and/or Hazardous Waste soil.

I. Storm water means water deposited at the site in the form of rain, snow or other natural weather event.

J. TACO means TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES in accordance with 35 Ill. Adm. Code Part 742.

K. Uncontaminated Soil means the soil referred to in 415 ILCS 5/3.160. Soil that is removed from an area that has never been developed as industrial or commercial may be considered uncontaminated. Soil that meets TACO Tier one residential standards may alsobe considered uncontaminated. See 35 Ill. Adm. Code, Part 742.

1.06 SUBMITTALS

A. The Contractor shall ensure that submittals are provided in compliance with specified time frame(s) to avoid delays in Work.

B. The Contractor shall prepare and submit the following documents to theowner's Representative for the off-site removal and transfer of CCDD:
   1. Name, address and telephone number of the CCDD fill site where CCDD to be transported. This submittal must be made at least five days prior to removal of any materials from the site. Once this submittal is made, the Contractor cannot change the fill site without written authorization from the owner's Representative. This information should include, at a minimum, the following:
      a. CCDD fill site name and address and telephone number;
      b. Site contact information, including contact person and phone number;
      c. Fill Site Identification number assigned by the IEPA;
      d. Executed CCDD Acceptance Agreement from the facility, setting forth its agreement and authorization to accept the identified material. The Contractor shall utilize the relevant Acceptance Agreement.

C. Once this submittal is made, the Contractor cannot change the fill site without written authorization from the owner's Representative.
   1. Name of Haulers to be used for the transportation of CCDD and Recycled Material. This submittal must be made at least five days prior to removal of any materials from the site. This information shall include, at a minimum, the following:
      a. Hauler name, address, contact information, including name and telephone number of authorized representative.
      b. Any relevant transportation license numbers.

D. Once this submittal is made, the Contractor cannot change the haulers without written authorization from the owner's Representative.

1. Stormwater Management Plan (SWP) - Prior to commencing any work at the site, the Contractor shall provide any required permits, such as a city stormwater discharge approval, or MWRD Discharge Authorization and a SWP. The SWP shall contain provisions for dewatering, pumping, collection, temporary storage, and discharge or disposal of storm water, perched water and other liquids, so as to facilitate soil removal. The SWP should include provisions for preventing storm water from entering excavation areas, or from going off-site. These may include, but not be limited to, surface grading, pumping and/or combination of silt fence, sandbags, tarpaulins, plastic sheeting, and movable straw bales. This SWP shall comply with all relevant contract documents and specifications, any relevant permit conditions, and all local, state and federal laws and regulations, including those of the Village of Streamwood Department of Water, the MWRD, and the IEPA, as relevant.
2. Copy of the Storm Water Discharge Approval from the Village of Streamwood Building Department and, if required, the MWRD Discharge Authorization, prior to pumping water into the Village of Streamwood sewer system.
3. Soil Management Plan (SMP). Prior to commencing any work, the Contractor shall provide a SMP outlining proposed excavation work sequences and procedures to separate each type of material to be removed from the site, separating any contaminated materials from any uncontaminated materials, and shall ensure that haulers are fully informed as to the appropriate destination for the materials. The SMP shall show the locations of each type of material to be stored on site, pending reuse as specified in the Contract Documents, or off-site transfer to appropriate location.
4. Reports and Other Submissions. The Contractor shall provide the owner's Representative with the following on a weekly basis:
    a. Copies of all fully executed CCDD facility receipts, which shall be legible and dated and shall contain a complete description of the material taken per truck. Owner shall provide tracking receipts that shall be utilized by the Contractor for all CCDD materials transported off-site. Contractor shall verify that all fields in the CCDD tracking receipts are complete prior to submittal.
    b. Copies of daily reports providing information regarding hauler names and volume or weight of material removed, and location taken, per truck.

E. Contractor shall provide submit the following for each Recycling Facility:
1. Name, Address, and Contact Information for each proposed Recycling Facility.
2. Copy of document (license, permit, etc.) that indicates that the facility is authorized to operate a recycling operation for proposed material(s).
3. Copies of recycling facility receipts for each load of material transported to the approved recycling facility.

1.07 SUBMITTAL REVIEW

A. Review of submittals or any comments made does not relieve the Contractor from compliance with the requirements of the drawings and specifications. The purpose of this check is to review for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; electing techniques of construction; coordinating the work; and performing the work in a safe and satisfactory manner, in compliance with all contract documents, specifications, and applicable laws and regulations.

1.08 NOTIFICATIONS

A. In order to ensure appropriate oversight of removal activities, the Contractor shall provide notification to the owner's Representative and MEC no less than forty-eight (48) business hours prior to excavating, loading and transporting of any materials from the site. The owner's Representative shall provide a representative onsite for field verification of the CCDD and Uncontaminated Soil.

1.09 RECORDKEEPING

A. The Contractor shall maintain and provide all records provided for in this Section. The Contractor shall also provide documentation of labor, equipment, and materials used for the CCDD and Uncontaminated Soil removal as required to fulfill the scope of work described in the Contract Document or as requested by the owner's Representative.

PART 2 PRODUCTS

2.01

A. The Contractor shall furnish all necessary means, products, tools, and equipment required to remove and dispose CCDD and Uncontaminated Soil from the site as directed by theowner's Representative.

PART 3 EXECUTION

3.01 AUTHORIZATIONS

A. The Contractor shall obtain appropriate authorization from the permitted CCDD fill site or from the authorized recycling facility where the material will be taken. The Contractor shall utilize the CCDD Acceptance Agreement.

3.02 MATERIAL SAMPLING

A. As directed by the owner's Representative, the Contractor shall provide the necessary equipment in any necessary field verifications to complete these activities at no additional cost to the project.

B. The Contractor shall not perform any field sampling or testing without a written authorization from owner's Representative. All field sampling and testing activities shall be coordinated with the owner's Representative for oversight and documentation.

3.03 EXCAVATION

A. The Contractor shall perform all site excavation in accordance with the Contract Documents.

B. The Contractor shall perform excavation of materials in accordance with all applicable regulations and project specifications. All excavation shall be performed in accordance with OSHA requirements and guidelines.

C. The Contractor shall immediately notify the owner's Representative if any materials, (solid or liquid) requiring special handling (i.e., contaminated soil, soil with odors, or liquids) are encountered during excavation. Such materials shall be separately stockpiled and shall not be loaded into hauling trucks without a written authorization from owner's Representative.

D. The Contractor shall coordinate all soil excavation and hauling from the site activities with the owner's Representative. The Contractor must provide a written notification to theowner's Representative at least 48-hour prior to starting any soil excavation and hauling from the site.

E. The Contractor shall review all of the Contract Documents and tests to become familiar with locations of materials designated as Uncontaminated Soils, Clean Construction or Demolition Debris, General Construction or Demolition Debris, Contaminated Soils, Special Waste, or Hazardous Waste. The Contractor shall excavate each type of material separately as practical and consistent with the Contractor's SMP, and shall clean excavation equipment prior to excavating CCDD and Uncontaminated soil.

F. The Contractor shall be responsible for maintaining the structural integrity of all surrounding streets, underground utilities, buildings, and structures (walkways, sidewalks, underground tunnels, etc.).

G. The Contractor shall secure, shore, and brace where sloping is not possible either because of space restrictions or stability of material excavated. Excavations shall be braced or sloped in compliance to the latest OSHA requirements and shall comply with local codes, authorities having jurisdiction, and the Village of Streamwood, and maintain same. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable conditions. Maintain shoring and bracing in excavations regardless of the time

period excavations will remain open. Carry down shoring and bracing as the excavation progresses.

3.04 DECONTAMINATION

A. The contractor shall clean and/or decontaminate excavation equipment (tools, shovels, backhoes, etc.) With a jet washer or steam cleaner prior to excavating uncontaminated soil, other CCDD materials or materials designated for recycling. All cleaning and/or decontamination residuals must be collected and disposed of in accordance with applicable federal, state and local regulations.

B. The contractor shall remove soils, dusts, rocks, etc. From the exterior of trucks, trailers, or other heavy equipment prior to leaving the site.

C. The contractor shall not allow equipment or trucks to leave the site with water leaking or mud dripping or caked to the equipment or trucks.

3.05 STOCKPILING

A. The contractor may stockpile excavated materials on site as approved by theowner's representative and as set forth in the contractor's SMP. The location of the stockpile area shall be approved by the owner's representative and it shall be in accordance with the Village of Streamwood requirements, including section 13-32 & 125 of the municipal code. The maximum height of the stockpile is 20 feet, provided appropriate setbacks, as set forth in the code, are met.

B. The contractor shall be responsible for keeping CCDD and uncontaminated soil separated from contaminated soils and general construction and demolition debris, special waste, and hazardous waste, as identified on contract drawings. If CCDD and uncontaminated soil come in contact with contaminated soils or general construction or demolition debris, special waste or hazardous waste, the former CCDD and uncontaminated soils will now be considered contaminated materials, and the contractor shall dispose of newly designated soils as contaminated soils at his own expense in accordance with section 312318.13. The contractor will be responsible for any sampling analysis costs associated with characterization of soil that has become contaminated pursuant to this subsection.

3.06 LOADING

A. The contractor shall notify the owner's representative 48 hours in advance of soil loading and hauling activities. No soil shall be removed from the site without the presence of theMEC.

B. Prior to loading, the contractor shall prepare and provide hauler with appropriately marked CCDD tracking receipts, for acceptance and confirmation at the receiving site.

C. The contractor shall load excavated materials directly from the site or from temporary stockpiles into hauling trucks equipped with tarp for direct transportation to the approved CCDD fill site or recycling facility.

D. The contractor shall conduct operations in a manner that minimizes interference with roads, streets, walks and other adjacent occupied and used facilities. The contractor shall not close or obstruct streets, walks or other occupied or used facilities without permission from the applicable governing agency and the owner's representative. If required by the appropriate governmental entity, the contractor shall provide alternate routes around closed or obstructed traffic ways.

E. The contractor shall ensure compliance with all state and local road/street weight limits.

3.07 TRANSPORTATION

A. All trucks shall be properly covered prior to leaving the site.

B. All CCDD and uncontaminated soil shall be transported directly to the approved CCDD fill site or recycling facility on a daily basis. No off-site temporary storage is allowed. All materials not transported to the CCDD fill operation or recycling facility shall be returned to the project site for overnight storage.

C. The contractor shall immediately notify the owner's representative if any CCDD or uncontaminated soil loads are rejected by the CCDD fill operation. A field order allowing for a change in transfer, to an appropriate facility, will be executed.

D. The contractor shall provide completed and executed copies of the CCDD tracking receipts to the owner's representative on weekly basis.

E. Drivers shall hold, and present upon request, a current valid commercial driver's license (cdl).

3.08 STORM WATER RUNOFF AND GROUNDWATER MANAGEMENT

A. The contractor shall have access to a weather notification system and manage the work so as not to accumulate storm water on the site during excavation.

B. The contractor shall prevent storm water, groundwater or perched water from entering excavation areas. The contractor shall implement the storm water management plan in accordance with conditions, or directed by the owner's representative.

C. The contractor shall manage and remove water from site excavation in accordance with the Village of Streamwood and MWRD's requirements. The contractor shall not discharge onsite water into the Village of Streamwood sewer without first obtaining all required permits from the Village of Streamwood building department and MWRD.

3.09 DUST CONTROL

A. The contractor shall control dust by all necessary means, including but not limited to covering trucks, stockpiles and open materials, watering haul roads, sweeping paved roads, and limiting the speed of all on-site vehicles.

B. The contractor shall not create dust and shall maintain adequate dust suppression equipment on site if conditions warrant.

C. The contractor shall maintain streets clean and free of mud and dirt.

3.10 NOISE CONTROL

A. The contractor shall not start any work activities prior to the time specified in the Village of Streamwood noise ordinance.

B. The contractor shall control the noise, in compliance with the Village of Streamwood noise ordinance, or as directed by the owner's representative where there are sensitive project-specific concerns, such as during school operating hours at school construction projects.

3.11 QUALITY CONTROL

A. Visual inspections and damage repairs shall be made daily by the contractor and/or as directed by the owner's representative to assure that erosion, drainage and containment control measures are functioning properly.

B. The contractor shall take all necessary precautions to protect structures, equipment, pavement, walks and utilities against movement or settlement during the course of work.

C. Damage: the contractor shall promptly replace or repair any damage caused to adjacent pavement, utilities or facilities by removal operations at no additional cost to the owner. Work shall be performed to the satisfaction of the owner's representative.

D. Submittal timeframe compliance: the contractor shall ensure that all required submittals are in compliance with time frames specified.

E. Utility services: the contractor shall maintain existing utilities and protect against damage during removal operations.

END SECTION

312318.13
CONTAMINATED SOIL GENERAL CONSTRUCTION DEMOLITION DEBRIS DISPOSAL

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Sampling, analytical environmental testing, and reporting of test results as required to properly characterize for disposal materials encountered on-site which will be disposed of off-site.
      b. Excavation, handling, on-site transport, and stockpiling of material encountered during Earth Moving operations for: building elements including foundations and slabs-on-grade, hardscape areas (such as paving, roads, and parking areas.), site structures and utilities, and landscape areas.
      c. Contractor shall stockpile material to be disposed off-site in area(s) designated by Construction Manager on the owner's property. Contractor will load, haul, and dispose off-site the stockpiled materials.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 RELATED WORK

A. Section 01 74 13 – Construction Cleaning

B. Section 31 10 00 – Site Clearing

C. Section 31 20 00 – Earth Moving

1.04 APPLICABILITY

A. This section applies to Contaminated Soil General Construction & Demolition Debris that does not meet the definition of Special Waste or Hazardous Wastes. The requirements of this section also apply to any contract Work required in public parkways and streets.

1.05 DEFINITIONS

A. Backfill means granular or cohesive material used to fill excavation or bring property to design grade as specified in the project drawings and specifications.

B. CFR means Code of Federal Regulations.

C. Owner's Representative means the person designated as the official representative of the owner in connection with the project.

D. Discharge Authorization (DA) is a written authorization issued by the MWRD giving permission to discharge wastewaters to its sewer system and sewage treatment facilities.

E. DOT means Department of Transportation.

F. General Construction and Demolition (C&D) Debris means non-hazardous, uncontaminated materials resulting from construction, remodeling, repair, and demolition of utilities, structures, and roads as defined in Public Act 92-0574, The Environmental Protection Act, 415 ILCS 5 Section 3.160 and regulated under Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling. C&D debris may include soil, wall coverings, reclaimed asphalt pavement, rock, plaster, glass, non-hazardous painted wood, drywall, plastics, non-hazardous coated wood, non-asbestos insulation, bricks, wood products, roofing shingles, concrete, and general roof coverings.

G. Hazardous waste means a waste, or combination of wastes, which has been identified by characteristics or listing as hazardous pursuant to Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L. 94-580, 40 CFR part 261, Illinois Environmental protection Act 415 ILCS 5/3.220, and Section 809.103 of Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board. A waste is classified as hazardous if it exhibits any of the following characteristics: 1) ignitability, 2) corrosivity, 3) reactivity, or 4) toxicity, and as defined in Illinois Administrative Code Title 35, Section 721.103 (35 IAC 721.103).

H. IDOT: Illinois Department of Transportation.

I. IEPA: Illinois Environmental Protection Agency.

J. Manifest means the form provided or prescribed by IEPA and used for identifying name, quality, routing, and destination of special waste during its transportation from point of generation to the point of disposal, treatment, or storage.

K. MWRD: Metropolitan Water Reclamation District.

L. OSHA: Occupational Safety and Health Administration.

M. Permitted Subtitle D landfill means any open and active solid waste landfill facility in any state licensed and/or permitted under the 40 CFR 258 or state equivalent to accept non-hazardous waste.

N. Permitted Subtitle C landfill/facility means any open and active facility in any state licensed and/or permitted under the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste and treated hazardous waste.

O. Soil means any granular or cohesive materials designated for removal as specified in the project drawings and specifications and includes soils that are determined to be Uncontaminated, Contaminated, Special or Hazardous waste.

P. Special waste means any wastes as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 808: Special Waste Classifications; Subpart A: General Provisions; Section 808.110,

AND

Any wastes as defined in Title 35: Environmental Protection; Subtitle G: Waste Disposal; Chapter I: Pollution Control Board; Subchapter i: Solid Waste and Special Waste Hauling; Part 809: Non Hazardous Special Waste Classifications; Subpart A: General Provisions; Section 809.103.

Q. Storm water means water deposited at the site in the form of rain, snow or other natural weather precipitation event.

R. USEPA: United States Environmental Protection Agency.

1.06 SUBMITTALS

A. Contractor's Site Specific Health and Safety Plan for all workers engaged in excavation, handling, and stockpiling of Contaminated Soil General Construction & Demolition Debris. The Plan shall comply with all OSHA requirements. The work shall be performed under the direct supervision of a trained experienced site supervisor. The Plan must at a minimum include the following:
   1. Name key personnel and alternates responsible for site safety.
   2. Risks and hazards associated with each operation to be conducted.
   3. Type of personnel training and responsibilities to handle the specific risks and hazards identified.
   4. Protective protective equipment (PPE) and clothing to be used by personnel during various site operations.
   5. Site-specific medical surveillance requirements.

6. Program for the periodic air monitoring, personnel monitoring, and environmental sampling if needed.
7. Actions to be taken to mitigate existing hazards to make the work environment less hazardous.
8. Site control measures including a site map.
9. Procedures for personnel and equipment and transporting trucks to ensure that impacted soils are not tracked off site on to non-impacted areas of the site.
10. Site Standard Operating Procedures (SOPs) for activities that can be standardized (i.e., decontamination procedures and respirator fit testing).
11. Contingency Plan for the safe and effective response to emergencies.

B. Soil Management Plan outlining proposed excavation work sequences and procedures to separate each type of material encountered. The Soil Management Plan shall show the locations for each type of material to be stored on site, and location of material to be stored on site for future disposal.

C. Storm Water Management Plan - prior to commencing work, the contractor shall provide a liquid materials handling plan. This plan shall include provisions for dewatering, pumping, collection, temporary storage, and discharge or disposal of storm water, perched water and other liquids, contaminated and/or uncontaminated, at the site so as to facilitate soil removal and minimize disposal costs for contaminated fluids. Contractor shall manage and remove water from the excavation in accordance with the Village of Streamwood and MWRD's requirements. The Contractor shall not discharge onsite water into the sewer system without procuring all required permits and approvals.

D. Copy of the pumping permit from the Village of Streamwood Building Department prior to pumping any water into the Village of Streamwood sewer system.

E. Copy of the MWRD Discharge Authorization prior to discharging any contaminated water into the MWRD sewer system.

F. Submittal Review: Review of submittals or any comments made does not relieve the Contractor from compliance with the requirements of the drawings and specifications. The purpose of this check is to review for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; electing techniques of construction; coordinating the Work; and performing the Work in a safe and satisfactory manner.

G. The Contractor must not begin any field work applicable to this Section until all required submittals have been reviewed and accepted by the Construction Manager and/or theowner's Representative.

1.07 NOTIFICATIONS

A. Contractor shall notify the Construction Manager a minimum of 48 hours prior to sampling Contaminated Soil General Construction & Demolition Debris. No sampling shall be performed by the Contractor without written approval by the Construction Manager.

1.08 RECORDKEEPING

A. The Contractor shall maintain and provide upon request documentation of labor, equipment, materials, and laboratory analysis involved in excavation, hauling, transport, and stockpiling of Contaminated Soil General Construction & Demolition Debris, when requested by the owner's Representative.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MATERIAL SAMPLING (BY CONTRACTOR)

A. The Contractor shall collect sufficient amount of representative sample(s) from the site for analysis to obtain authorization for the ultimate disposition of Contaminated Soil General

Construction & Demolition Debris. The Contractor is responsible for payment of all sampling and analysis costs.

B. The Contractor shall be responsible for obtaining liquid samples as needed for characterization for liquid disposal offsite, disposition onsite, or discharge to sewer, as approved by owner's Representative. The Contractor is responsible to the acquisition of any required disposal permits and the payment of any fees associated with liquid disposal.

C. The Contractor shall submit the soil and liquid samples (as applicable) to the laboratory and pay for the cost of analyzing the constituents required for the ultimate disposition of soils and liquids.

D. The owner's Representative may also collect samples for laboratory analysis or field Photo-ionization Detector (PID) screening, or liquid samples for laboratory analysis. The Contractor shall provide the necessary equipment and manpower to assist the Construction Manager and the owner's Representative to collect materials to be sampled at no additional cost to the owner's.

E. The Contractor shall immediately notify the owner's Representative if any materials, (solid or liquid) requiring special handling (i.e., stained soil, soil with odors, or liquids) not identified in Contract Documents are encountered.

3.02 EXCAVATION (BY CONTRACTOR)

A. The Contractor shall perform all Contaminated Soil General Construction & Demolition Debris removal work in accordance with Contract Documents.

B. All excavation shall be performed in accordance with OSHA requirements and guidelines.

C. The Contractor shall immediately notify the owner's Representative if any materials, (solid or liquid) requiring special handling (i.e., stained soil, soil with odors, or liquids) are encountered outside of designated areas in Contract Documents. Such materials shall be separately stockpiled or, if liquid, contained within excavation or area where encountered. Materials shall not be loaded/pumped into hauling trucks/tankers without a written authorization from the Construction Manager and/or the owner.

D. The Contractor shall coordinate all Contaminated Soil General Construction & Demolition Debris removal from the site activities with the Construction Manager and/or theowner's Representative. The Contractor must provide a written notification to the Construction Manager and/or the owner's Representative at least 48-hour prior to starting any Contaminated Soil and General Construction & Demolition Debris removal activity from the site.

E. Areas of the site may be classified differently in the Contract Documents. Contractor shall be responsible for the removal of each type of material separately. Contractor shall decontaminate all excavation equipment prior to excavating different classifications of materials generated onsite.

F. The Contractor shall be responsible for maintaining the structural integrity of all surrounding streets, underground utilities, buildings, and structures (walkways, sidewalks, underground tunnels, etc.).

G. Secure, shore, and brace where sloping is not possible either because of space restrictions or stability of material excavated. Excavations shall be braced or sloped in compliance to the latest Occupational Safety and Health Administration (OSHA) requirements and shall comply with local codes, authorities having jurisdiction, and the Village of Streamwood, and maintain same. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable conditions. Maintain shoring and bracing in excavations regardless of the time period excavations will remain open. Carry down shoring and bracing as the excavation progresses.

H. In the event the Contractor causes contaminated materials to be discharged onto, or come into contact with site surface materials including but not limited to soils, asphalt, concrete,

bricks, gravel, and the surface cannot be decontaminated, the surface materials shall be considered contaminated. The Contractor shall submit the sample(s) to the laboratory and pay for the cost of analyzing the constituents required for the ultimate disposition of such materials.

3.03 DECONTAMINATION (BY CONTRACTOR)

A. The Contractor shall remove soils, dusts, rocks, etc. from the exterior of trucks, trailers, or other heavy equipment leaving the site before they leave the site.

B. The Contractor shall not create dust and shall maintain adequate dust suppression equipment on site if conditions warrant.

C. The Contractor shall maintain streets clean and free of mud and dirt.

D. The Contractor shall clean and/or decontaminate equipment (tools, shovels, backhoes, pumps, hoses, etc.) with a jet washer or steam cleaner after completing work in the Special Waste and/or Hazardous Waste areas and prior to start working in areas of the site with different waste classifications. All cleaning and/or decontamination residuals must be collected and disposed of in accordance with applicable federal, state and local regulations at no additional cost to the owner.

3.04 STOCKPILING (BY CONTRACTOR)

A. Contractor may stockpile the Contaminated Soil General Construction & Demolition Debris as approved by the owner's Representative. The Contractor shall be responsible for keeping such soils/materials separated from soils/materials that are not designated as Contaminated Soil and General Construction & Demolition Debris. If any such commingling occurs, the waste soils will now be considered Contaminated Soil and General Construction & Demolition Debris or the more stringent classification, as applicable. The Contractor will be responsible for sampling analysis costs associated with characterization of newly designatedwastes.

B. The location of the stockpile area shall be coordinated with the Construction Manager and/or the owner's Representative. The Contractor shall keep special wastes, non-hazardous special waste, or hazardous waste soils, covered with 6-mil polyethylene visqueen or containerized until subsequent loading, transportation and disposal. For stockpiled soils, provide a 12" to 18" berm around the stockpile. Base sheeting shall overlap the dike. The maximum height of the stockpile shall not exceed 10 feet.

C. The Contractor shall not allow runoff from stockpiled soil/materials to enter storm drains or to leave the site.

3.05 LOADING (BY CONTRACTOR)

A. The Contractor shall prepare and receive approval from the Construction Manager and/or the owner's Representative for all disposal documents prior to starting any loading activities.

B. The Contractor shall notify owner's Representative a minimum of 48 hours prior to any loading and hauling activities. No Contaminated Soil General Construction & Demolition Debris shall be removed from the property without the presence of theowner's Representative.

C. The Contractor shall load Contaminated Soil General Construction & Demolition Debris waste directly from the site or from temporary stockpiles into hauling trucks for subsequent transportation and ultimate disposition. The soil shall not leave the site without the presence of the owner's Representative.

D. The Contractor shall prepare disposal receipts prior to starting any soil loading activities.

E. The Contractor shall load excavated materials directly from the site or from temporary stockpiles into hauling trucks equipped with tarp covers for subsequent transportation and ultimate disposition directly to the landfill.

F. Traffic: Conduct Contaminated Soil General Construction & Demolition Debris removal to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from the owner's Representative. Provide alternate routes around closed or obstructed traffic ways if required by the Construction Manager and/or theowner.

G. The Contractor is responsible for complying with State and local Road/Street weight limits.

3.06 TRANSPORTATION (BY CONTRACTOR)

A. All General Construction & Demolition Debris must be transported directly to the disposal facility from the site. Intermediate storage is not permitted. All wastes not transported to the designated and approved facility shall be returned to the site for overnight storage.

B. The Contractor shall remove soils, dusts, rocks, etc. from the exterior of trucks, trailers, or other heavy equipment before they leave the site.

C. The Contractor shall provide and complete copies of all daily reports, transport manifests, weight tickets, and receipts (as applicable) for transportation and ultimate disposition of the General Construction & Demolition Debris materials to the owner's Representative on daily basis.

D. Drivers shall hold, and present upon request, a current valid Commercial Driver's License (CDL).

3.07 DISPOSAL (BY CONTRACTOR)

A. Solids - The Contractor shall provide copies of weight tickets and/or volume (cubic yards/tonnage) receipts from the landfill facility accepting the General Construction & Demolition Debris waste materials to the Construction Manager and/or the owner's Representative within two business days.

B. Liquids - The Contractor shall provide copies of weight tickets and/or volume (gallons) receipts/manifests from the permitted treatment and/or disposal facility accepting Special Wastes to the Construction Manager and/or the owner's Representative within two business days.

C. Contractor shall provide copies of completed tracking tickets/manifests executed by the owner's Representative, transporter and the permitted facility accepting the General Construction & Demolition Debris to the owner's Representative within two business days of off-site removal. Original manifests forwarded from the receiving facility to the Generator will not be available to Contractor. Contractor shall collect, organize by date, and submit transporter copy to the owner's Representative. Submittal shall include summary table which identifies manifest number, date, transporter, and associated weight ticket or volume receipt.

3.08 STORM WATER RUNOFF & GROUNDWATER MANAGEMENT (BY CONTRACTOR)

A. Contractor shall have access to a weather notification system and manage the work so as not to accumulate storm water on the site during excavation.

B. Contractor shall prevent storm water, groundwater water or perched water from entering the excavation areas. Incorporate preventative measures to avoid contact of such liquid with Contaminated Soil, if present on site. Earthen berms, plastic (polyethylene) sheeting, pumping, and other such means, as specified in the approved Storm Water Management Plan, shall be used.

C. Contractor shall implement the approved Storm Water Management Plan as conditions warrant or as directed by the Construction Manager. The Contractor shall manage and remove water from site excavation in accordance with the Village of Streamwood and MWRD's requirements. The Contractor shall not discharge onsite water into the Village of Streamwood or MWRD sewer without first obtaining all required permits in accordance with the following procedures:
   1. If there is no evidence of water contamination as determined by the Construction Manager, Contractor shall obtain pumping permit from the Village of Streamwood.
   2. If the Construction Manager determines the presence of contaminated water at the site, Contractor shall collect and analyze representative water sample in accordance with MWRD Environmental Remediation Wastewater (ERW) Ordinance requirements. Submit a copy of the analytical result to the Construction Manager within seven (7) working days of sample collection.

3. If the analytical result of the water sample is below the maximum concentrations acceptable for discharge of ERW into sewerage system, the Contractor shall be responsible for performing the following:
    a. Secure a special discharge authorization from the MWRD for discharging contaminated water into the MWRD sewer system.
    b. Install and operate flow meters for measuring the volume of water discharged into the sewer system. Flow meters can be either installed on the settling tank, if used, or at each discharging manhole. Each flow meter must meet the MWRD's requirements including a non-resettable totalizer and must be equipped with recorder charts. Totalizers must be read a minimum of once per week and a log of such readings, with the appropriate conversion factors, and recorder charts must be provided to the Construction Manager. Each flow-measurement device must be calibrated prior to its initial use and at least monthly thereafter. The accuracy of each device must be certified by a factory-authorized representative with documentation of this certification provided to the Construction Manager and submitted to the MWRD.
    c. Collect and analyze representative water samples on minimum monthly basis for the parameters required by the MWRD ERW special authorization. Analytical results and Sample Collection, Analysis and Report Certification should be provided to Construction Manager within 7 working days of sample collection.
4. If the analytical results of the water exceed the MWRD ERW ordinance requirements, water should be either pumped into holding tank for future transportation and disposal at treatment facility, or pumped directly into vacuum truck for disposal at a treatment facility as Special Waste. Prior to transporting water to a treatment facility, the Construction Manager may collect confirmation water samples to verify that the analytical results do not meet the MWRD's requirements. The Contractor shall provide all required equipment and access to collect such samples.

D. If the Contractor, through negligence, allows storm water to contact Contaminated Soil and thereby contaminates the storm water so that the water must be disposed of as contaminated water, the Contractor shall be responsible for the additional costs incurred for any disposal. Contractor shall perform this work at no additional cost to the owner.

3.09 DUST CONTROL (BY CONTRACTOR)

A. The Contractor shall control dust by all necessary means, including but not limited to covering trucks, stockpiles and open materials, watering haul roads, sweeping paved roads, and limiting the speed of all on-site vehicles.

B. The Contractor shall not create undue dust and shall maintain adequate dust suppression equipment on site as conditions warrant.

C. The Contractor shall maintain streets clean and free of mud and dirt. Contractor shall perform all necessary activities to keep roadways clean throughout each day and for the duration of the project.

3.10 NOISE CONTROL (BY CONTRACTOR)

A. The Contractor shall not start any work activities prior to the time specified in the Village of Streamwood Noise Ordinance of the Municipal Code.

B. The Contractor shall control noise in accordance with the Village of Streamwood Noise Ordinance or as directed by the owner's Representative during normal school operating hours.

3.11 QUALITY CONTROL (BY CONTRACTOR)

A. The Contractor shall take all necessary precautions to protect structures, equipment, pavement, walks and utilities against movement or settlement during the course of work. Visual inspections and damage repairs shall be made daily by the Contractor and/or as directed by the owner's Representative to assure that erosion, drainage and containment control measures are functioning properly.

B. Damages: Promptly replace or repair any damage caused to adjacent pavement, utilities or facilities by removal operations at no additional cost to the owner. Work shall be performed to the satisfaction of the owner's Representative.

C. Utility Services: Maintain existing utilities and protect against damage during removal operations.

D. Submittal Timeframe Compliance: Ensure that all required submittals are in compliance with time frames specified.

E. Storage Area Inspections: Perform daily checks of any Soil/Waste Storage locations to ensure they are secure.

END SECTION

313000
SOIL EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid
   1. General Contractor:
      a. Constructing temporary erosion control systems as shown on the plans, or as directed by the Engineer, to control erosion and sediment damage.
      b. Provide perimeter silt filter fence. Provide silt protection for all inlets/catch basins.
      c. Provide appropriate dust control.
      d. Follow proper staging, stockpiling, and construction sequencing procedures.
      e. Provide other sediment and erosion control measures as necessary.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 RELATED WORK

A. Section 312000 – Earth Moving

1.04 REFERENCES

A. Illinois Department of Transportation, Standard Specifications for Road and Bridge Construction (IDOT SSRBC), January 1, 2022 edition.

B. Comply with provisions of site-specific SWPPP, if applicable.

1.05 SUBMITTALS

A. Erosion and Sediment Control Plan
   1. Submit erosion and sediment control drawings specific to the site within ten (10) days of Notice to Proceed (NTP). Show locations, types and details of erosion and sediment control features and construction.
   2. Show the schedule of implementation coordinated with the construction schedule.
   3. Include a narrative describing the program and maintenance.

B. Product Data: Submit manufacturer's product data and installation instructions for each material and product used, including:
   1. Silt Fence Geotextile Filter Fabric
   2. Inlet Filter Basket
   3. Specialty Products Utilized

1.06 QUALITY ASSURANCE

A. Requirements: Create and implement an Erosion and Sedimentation Control Plan that conforms to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program.

B. Contractor shall designate a competent individual who shall be responsible for ensuring erosion control measures are properly installed and maintained.

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

D. Objectives:
   1. Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting stock pits for reuse.
   2. Prevent sedimentation of storm sewer or receiving streams.
   3. Prevent polluting the air with dust and particulate matter.

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt Filter Fence: Meeting the requirements of IDOT SSRBC Section 1080.02.

B. Temporary Erosion Control Seeding: Meeting the requirements of IDOT SSRBC Section 1081.15(g).

C. Inlet filters: Shall be of the type specified on the plans and shall meet the requirements of IDOT SSRBC Section 1081.15(h).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

B. All temporary erosion control measures shall be in place and effective before any land-disturbing activities commence.

3.02 INSPECTION

A. Contactor shall inspect, by a competent individual, all temporary erosion control measures at least once every seven (7) calendar days and after every significant precipitation event for evidence of damage or ineffectiveness. Deficiencies shall be corrected immediately. Incidents of non-compliance shall be reported immediately to the Construction Manager and as required by regulation.

3.03 MAINTENANCE

A. Contractor shall maintain all temporary erosion control measures in a clean and well-functioning state throughout the project.

B. Contractor shall maintain all temporary erosion control measures until all site surfaces have been permanently stabilized.

3.04 PHASING

A. Contractor shall incorporate all permanent stabilization measures into the project at the earliest practical time to minimize the need for temporary controls.

END SECTION

313200
STONE COLUMN GROUND IMPROVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Performance design, furnishing, and installation of stone columns or compacted aggregate piers supporting shallow spread footings for the pavilion canopy and deck structures indicated on the Structural Drawings.
   2. Stone-column layout, installation procedures, verification testing, quality-control documentation, and final certification.
   3. Preparation and acceptance of the immediate stone-column working surface and construction of the load-transfer pad directly associated with the ground-improvement system.

B. Scope Limitation: Work of this Section applies only to foundations supporting the canopy and structural deck. Light poles, pavements, retaining walls, landscape construction, utilities, and other site improvements are not included.

C. Related Requirements:
   1. Section 03 20 10 - Concrete Reinforcing.
   2. Section 03 30 10 - Cast-in-Place Concrete.
   3. Section 31 20 00 - Earth Moving, for excavation, general dewatering, removal of unsuitable material, fill placement, and preparation of the site to the working elevation.
   4. Section 31 41 00 - Acceptance of Backfill, for testing and acceptance of fill outside the specialty ground-improvement system and where referenced by this Section.

1.02 DEFINITIONS

A. Geotechnical Engineer: The Owner's designated geotechnical representative responsible for interpreting the geotechnical reports and providing construction-phase geotechnical review and observation.

B. Specialty Contractor: Firm experienced in the design and installation of stone columns or compacted aggregate piers and responsible for the complete performance of the ground-improvement system.

C. Specialty Engineer: Professional Engineer licensed in Illinois, retained by the Specialty Contractor, responsible for the delegated design and final certification of the ground-improvement system.

D. Structural Engineer of Record: Engineer responsible for the structural foundation design and for providing foundation loads and geometry.

E. Load-Transfer Pad: Compacted aggregate layer constructed above completed stone columns to distribute footing loads to the improved ground.

1.03 REFERENCE DOCUMENTS

A. Reference Geotechnical Document:
   1. Rubino Engineering, Inc., Additional Geotechnical Engineering Services Report Addendum 2, dated November 7, 2025, for the proposed pavilion canopy and deck foundations.
   2. The recommendation to support the canopy and deck shallow spread footings on a stone-column or other ground-improvement system, the maximum 3,000 psf allowable service bearing pressure are as provided by Rubino Engineering, Inc. in the Reference Geotechnical Document.
   3. The Specialty Contractor and Specialty Engineer shall obtain and evaluate the complete geotechnical information referenced by Addendum 2 and remain fully responsible for the

delegated design, installation, testing, and performance of the ground-improvement system.

B. Codes and Standards:
   1. 2024 International Building Code, Chapters 17 and 18.
   2. ASTM C33 - Concrete Aggregates, where used as a material-quality reference and as modified by the approved delegated design.
   3. ASTM D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort, where required for the working platform or load-transfer pad.
   4. ASTM D6938 - In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods, where approved for compaction testing.

1.04 PERFORMANCE REQUIREMENTS

A. Delegated Design: Provide a complete ground-improvement system designed by the Specialty Engineer and installed by the Specialty Contractor.
   1. Base the design on the Reference Geotechnical Document, the actual foundation geometry, and subsurface conditions encountered during installation.
   2. Include column diameter, spacing, depth, termination criteria, installation method, treatment limits, load-transfer pad, and verification testing required to satisfy the specified performance.

B. Bearing Capacity:
   1. The structural foundations shown on the Drawings have been proportioned using a maximum allowable service bearing pressure of 3,000 psf, as provided by Rubino Engineering, Inc. in the Geotechnical Engineering Services Report Addendum 2, dated November 7, 2025.
   2. Design, install, and verify the ground-improvement system to provide an allowable service bearing capacity of not less than 3,000 psf beneath the full bearing area of each footing shown on the Structural Drawings.
   3. If field conditions, delegated design, or verification testing indicate that 3,000 psf cannot be achieved, stop affected Work and notify the Specialty Engineer and Structural Engineer of Record before proceeding.

C. Settlement:
   1. Design the ground-improvement system using the footing dimensions, locations, and relationships indicated on the Structural Drawings, with a uniform service-level bearing pressure of 3,000 psf applied over the full bearing area of each footing.
   2. Calculate predicted total and differential settlement for each footing, including settlement within the improved zone, load-transfer pad, and underlying untreated soils.
   3. Limit predicted settlement as follows:
      a. Total settlement: 1 inch maximum.
      b. Differential settlement between foundations supporting connected structural framing: the lesser of 1/2 inch or L/500, where L is the center-to-center distance between foundations.
   4. Account for group effects, footing-edge conditions, variable fill and soft clay, construction sequence, and interaction between adjacent foundations.
   5. Include settlement calculations and predicted movements in the delegated-design submittal, signed and sealed by the Specialty Engineer.

D. Frost Protection: Provide exterior footing bottoms at least 3 feet 6 inches below final exterior grade unless otherwise noted on structural drawings and protect footings from freezing during and after construction, and as indicated on the Structural Drawings.

E. System Limits: Extend treatment beyond footing edges and to depths necessary to develop the required bearing and settlement performance. Establish final limits in the delegated design.

1.05 SUBMITTALS

A. Delegated-Design Submittal: Submit calculations and drawings signed and sealed by the Specialty Engineer.
   1. Show each canopy and deck footing, allowable stone column load, footing contact pressure, stone column layout, identification number, diameter, spacing, depth, estimated tip elevation, and treatment limits.
   2. Show working elevation, required working-platform properties, load-transfer pad material, thickness, lateral extent, lift thickness, and compaction requirements.
   3. Describe installation equipment, procedures, aggregate placement, compaction method, termination or refusal criteria, and procedures for obstructions or changed conditions.
   4. Provide bearing-capacity calculations, settlement calculations, and evaluation of group effects and adjacent foundations.
   5. Provide a verification-testing plan identifying test type, test locations, test geometry, maximum test load, loading increments, hold periods, instrumentation, reporting, and proposed acceptance criteria.
   6. Provide procedures for evaluating and correcting columns outside tolerances, columns with insufficient aggregate consumption, interrupted columns, and failed verification tests.
   7. Do not begin installation until the signed and sealed delegated-design submittal has been submitted and reviewed by the Structural Engineer of Record for general compatibility with the structural foundation design. Such review does not transfer responsibility for the ground-improvement design or performance.

B. Product Data: Submit aggregate source, gradation, durability information, and load-transfer pad materials.

C. Qualifications: Submit qualifications of the Specialty Contractor, Specialty Engineer, superintendent, and testing personnel.

D. Installation Records: Submit daily records and individual column logs within 48 hours after installation.

E. Testing Reports: Submit verification and quality-control test reports promptly after completion of each test.

F. Record Drawings: Submit final as-built column locations, top elevations, installed depths, and approved deviations.

G. Final Certifications:
   1. Specialty Engineer's signed and sealed certification that the installed system conforms to the approved delegated design and achieves the specified performance.
   2. Independent Testing Agency's final report compiling working-platform and load-transfer-pad compaction results and ground-improvement verification-test results.

1.06 QUALITY ASSURANCE

A. Specialty Contractor Qualifications: Firm with at least five years of successful experience and at least five completed projects using the proposed stone-column system in soil conditions and under foundation loads comparable to this Project.

B. Specialty Engineer Qualifications: Professional Engineer licensed in Illinois with at least five years of experience designing the proposed system.

C. Independent Testing Agency: The Contractor shall retain an agency independent of the Specialty Contractor, qualified in accordance with ASTM E329, and experienced in testing ground-improvement systems and compacted aggregate.
   1. Perform compaction testing of the working platform and load-transfer pad and instrument or independently document verification tests required by the approved testing plan.
   2. Provide factual test results directly to the Contractor, Specialty Engineer, and Structural Engineer of Record.

3. The Specialty Engineer shall interpret test results and field conditions and shall determine whether the prepared subgrade, installed columns, and load-transfer pad comply with the delegated design.
4. The Specialty Engineer shall issue signed and sealed written authorization to proceed with canopy and deck foundation construction after reviewing installation records and passing test results.
5. Testing and documentation by the Independent Testing Agency do not relieve the Specialty Contractor or Specialty Engineer of responsibility for design, installation, means and methods, safety, or performance of the ground-improvement system.

D. Structural Engineer of Record Review: Review of delegated-design submittals is limited to general compatibility with foundation loads, geometry, elevations, and structural design criteria and does not include approval of geotechnical design, installation methods, or testing adequacy.

E. Preinstallation Conference: Conduct before earthwork reaches the stone-column working elevation. Include the Owner, Contractor, Civil Contractor, Specialty Contractor, Specialty Engineer, Independent Testing Agency, and Structural Engineer of Record.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect aggregate from contamination, segregation, excessive moisture, frozen material, soil, debris, and mixing with unapproved materials.

B. Store materials on firm, drained surfaces and identify stockpiles by source and intended use.

1.08 FIELD CONDITIONS

A. Locate utilities and underground obstructions before installation. Coordinate with Section 31 20 00 and applicable utility requirements.

B. Immediately notify the Contractor, Specialty Engineer, and Structural Engineer of Record of groundwater, unsuitable fill, organic soils, obstructions, soil conditions materially different from the Reference Geotechnical Document, or conditions that prevent installation in accordance with the approved delegated design.

C. Do not conceal changed conditions or modify the system without written direction through an accepted revised delegated design.

PART 2 PRODUCTS

2.01 STONE-COLUMN SYSTEM

A. Provide a proprietary or contractor-designed stone-column or compacted aggregate-pier system that densifies, reinforces, and improves the existing soils without relying on structural concrete or steel reinforcement.

B. Use replacement, displacement, vibro-replacement, rammed aggregate-pier, or similar methods demonstrated by the Specialty Contractor to be suitable for the soils described in the Reference Geotechnical Document.

C. Alternative rigid-inclusion, grouted-column, or deep-foundation systems are not permitted under this Section unless submitted as a substitution and accepted in writing by the Owner and Structural Engineer of Record.

2.02 AGGREGATE

A. Provide clean, hard, durable crushed stone or crushed gravel selected by the Specialty Engineer for the installation method and required performance.

B. Aggregate shall be free of organic material, clay lumps, frozen material, construction debris, recycled asphalt, and other deleterious substances.

C. Provide gradation, angularity, durability, and maximum particle size compatible with the equipment, soil conditions, and approved design.

D. Do not use recycled concrete aggregate unless specifically evaluated and accepted in writing by the Specialty Engineer.

2.03 LOAD-TRANSFER PAD MATERIAL

A. Provide well-graded crushed aggregate or other granular material specified in the approved delegated design.

B. Material shall be nonfrost-susceptible, readily compactable, and compatible with the stone-column system and foundation construction.

C. Use geotextile separation or reinforcement only where required by the approved delegated design.

2.04 INSTALLATION EQUIPMENT AND MONITORING

A. Provide equipment capable of installing columns to the required depth and diameter and compacting aggregate to achieve the specified performance.

B. Provide calibrated monitoring equipment appropriate to the system to record depth, installation time, aggregate consumption, compaction or crowd parameters, and other system-specific quality-control data.

PART 3 EXECUTION

3.01 EXAMINATION AND COORDINATION

A. Verify foundation locations, footing geometry, structural loads, working elevation, utilities, access, and sequencing before installation.

B. Coordinate earthwork with Section 31 20 00. The Civil Contractor shall bring the site to the required working elevation, provide general dewatering, and remove site debris and unsuitable material as directed.

C. The Specialty Contractor shall inspect the working surface and confirm in writing that it is suitable for the proposed equipment and installation method before mobilizing.

D. The Specialty Contractor and Specialty Engineer shall examine the exposed working surface and provide written acceptance or direction for additional undercut, stabilization, or replacement before stone-column installation.

E. Do not proceed on frozen, inundated, pumping, unstable, or unaccepted subgrade.

3.02 SUBGRADE AND WORKING-PLATFORM PREPARATION

A. Remove topsoil, organic material, construction debris, uncontrolled loose fill, and material disturbed by excavation from within the canopy and deck foundation treatment areas.

B. Proofroll or otherwise evaluate the working surface where feasible under observation of the Independent Testing Agency. The Specialty Engineer shall determine locations requiring undercut or stabilization based on observed performance, test results, and exposed conditions.

C. Undercut unsuitable, soft, pumping, frozen, or excessively wet material to limits established by the Specialty Engineer. Replace with approved granular fill placed and compacted in accordance with Section 31 20 00 and tested under Section 31 41 00.

D. Provide a stable working platform designed for the actual installation equipment. The Contractor and Specialty Contractor remain responsible for platform stability, construction safety, and equipment support.

E. Maintain positive drainage and dewater excavations. Foundations and load-transfer pads shall be constructed on dry, unfrozen surfaces.

F. Protect the accepted subgrade from construction traffic, rutting, rain, freezing, and disturbance. Recondition disturbed areas and obtain renewed written acceptance from the Specialty Engineer.

3.03 TEST INSTALLATION

A. Install test or demonstration columns before production installation where required by the approved testing plan.

B. Use the test installation to confirm equipment, installation procedures, aggregate consumption, depth and termination criteria, and expected ground response.

C. Adjust the delegated design and installation procedure when directed by the Specialty Engineer based on test results. Submit revisions affecting foundation support, treatment limits, or settlement to the Structural Engineer of Record for coordination.

3.04 STONE-COLUMN INSTALLATION

A. Survey and stake column locations from established project control. Protect layout control throughout installation.

B. Install columns in the sequence, diameter, spacing, depth, and manner shown in the approved delegated design.

C. Advance the installation tool and place and compact aggregate in controlled lifts using the approved procedure. Maintain continuity of each column and prevent contamination by surrounding soil.

D. Use the approved termination criteria. Do not terminate a column solely at an assumed elevation when installation response or field conditions indicate that additional treatment may be required.

E. Monitor ground heave, lateral displacement, settlement, vibration, and effects on adjacent utilities and completed work. Modify sequence or procedures where necessary to prevent damage, subject to the approved design.

F. Immediately stop affected installation and notify the Specialty Engineer and Structural Engineer of Record when obstructions, excessive heave, loss of aggregate, unexpected groundwater, materially different soils, or inability to satisfy installation criteria is encountered.

G. Do not relocate, omit, shorten, or replace columns without an accepted revised design.

H. Trim and compact column tops to the approved elevation without loosening or contaminating the completed column.

3.05 LOAD-TRANSFER PAD

A. Construct the load-transfer pad only after columns in the affected area have been completed, documented, and accepted for continuation of Work.

B. Place pad material to the thickness, lateral extent, lift thickness, moisture condition, and compaction specified in the approved delegated design.

C. Extend the pad beyond footing edges as required by the delegated design. Do not assume the footing dimensions define the limits of treatment or pad construction.

D. Do not disturb or excavate into completed column tops. Repair disturbed areas in accordance with a signed and sealed procedure prepared and accepted by the Specialty Engineer.

E. The Specialty Engineer shall review completed-column records, load-transfer-pad compaction results, and the footing bearing surface and shall provide written authorization before reinforcing steel, forms, or concrete are placed.

3.06 INSTALLATION RECORDS

A. Maintain a separate log for each column including:
   1. Column identification and surveyed location.
   2. Date and time of installation and equipment used.
   3. Existing working-surface elevation, installed top elevation, installed depth, and termination elevation.
   4. Aggregate source and estimated quantity placed.
   5. System-specific installation and compaction parameters.
   6. Obstructions, interruptions, unusual ground response, groundwater, deviations, and corrective actions.
   7. Name of the Specialty Contractor's superintendent and Independent Testing Agency personnel present.

3.07 FIELD QUALITY CONTROL AND VERIFICATION

A. Specialty Contractor Quality Control: Provide full-time supervision by personnel experienced with the proposed system and continuously evaluate installation data for compliance with the approved design.

B. Independent Testing Agency Observation: Permit the agency access to observe and document subgrade evaluation, test installations, production installation, load-transfer-pad construction, and verification testing as required by the approved testing plan.

C. Verification Testing:
   1. Perform full-scale modulus or load testing of representative production or test columns in accordance with the approved testing plan.
   2. Provide not less than two verification tests, unless another frequency is established in the signed and sealed testing plan by the Specialty Engineer: one representative of the canopy foundation system and one representative of the deck foundation system.
   3. Load each test to at least 150 percent of the maximum service-level footing contact pressure applicable to the tested area, unless a greater load is required by the Specialty Engineer.
   4. Measure load, displacement, time-dependent movement, and rebound. The Specialty Engineer shall establish acceptance criteria in the delegated design and submit the criteria to the Structural Engineer of Record for coordination before testing.
   5. Perform additional tests when directed by the Specialty Engineer due to variable subsurface conditions, installation irregularities, failed tests, or changes in equipment or procedures.

D. Failed or Questionable Work: Submit a signed and sealed evaluation and corrective-action plan from the Specialty Engineer. Do not construct affected foundations until corrective work and retesting have been accepted in writing by the Specialty Engineer and impacts to the structural foundation design have been resolved with the Structural Engineer of Record.

3.08 TOLERANCES AND NONCONFORMING WORK

A. Install columns within the location, verticality, diameter, depth, and top-elevation tolerances stated in the approved delegated design.

B. Survey columns where location cannot be confirmed visually or where displacement is suspected.

C. The Specialty Engineer shall evaluate each deviation for effective treatment area, footing support, group effects, and settlement. Provide supplemental columns or other corrective work where required.

D. Review, observation, or testing by others does not constitute acceptance of undocumented deviations or relieve the Specialty Contractor or Specialty Engineer of responsibility for nonconforming Work.

3.09 PROTECTION

A. Protect completed columns and load-transfer pads from contamination, excavation, erosion, ponding, freezing, rutting, and construction traffic.

B. Do not stockpile materials or operate equipment over completed treatment areas unless loads have been evaluated and accepted by the Specialty Engineer.

C. Protect footing excavations and completed bearing surfaces from freezing in accordance with the criteria provided by Rubino Engineering, Inc. in the Reference Geotechnical Document and the Structural Drawings.

D. Repair damage using a signed and sealed procedure prepared and accepted by the Specialty Engineer. Submit repairs affecting foundation geometry or structural interfaces to the Structural Engineer of Record for coordination

3.10 FINAL ACCEPTANCE

A. Do not place canopy or deck foundation concrete until the following have been received and accepted:
   1. Complete installation logs and record drawings.
   2. Passing verification-test reports.
   3. Specialty Engineer's signed and sealed final certification.
   4. Specialty Engineer's signed and sealed written confirmation that the improved ground, load-transfer pad, and footing bearing surfaces are suitable for construction of the canopy and deck foundations.
   5. Written resolution of deviations, failed tests, and changed conditions affecting the structural foundation design.

END SECTION

314000
TRENCHING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid
   1. General Contractor:
      a. Excavation for - trenches for water, sanitary sewer, site drainage, and storm sewer lines to public utility.
      b. Compacted bed and compacted fill over utilities to subgrade elevations.
      c. Compaction.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor, the Plumbing Prime Contractor, the Heating Prime Contractor, and the Electrical Prime Contractor, each in their respective disciplines.

1.03 SUBMITTALS

A. Submit 10 lb. sample of each type of fill to testing agency, in separate airtight containers.

1.04 TESTS

A. Tests and analysis of fill materials will be performed in accord with ASTM D1557, and with General Conditions and testing required by Section 31 41 00 "Acceptance of Backfill" for acceptability as fill material.

1.05 REFERENCES

A. ASTM C136, - Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1556, - Density of Soil in place by Sand-Cone Method.

C. ASTM D1557, - Tests for Moisture-Density Relationship of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.

D. 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and Appendix B., Section 742, Table A.; Tiered Approach To Corrective Action Objectives (Taco): 35 Ill .Adm. Code 742.

E. Standard Specifications for Water and Sewer Main Construction in Illinois (SSWSMCI), 6th edition 2009.

F. Illinois Department of Transportation (IDOT):
   1. IDOT Standard Specifications for Road and Bridge Construction (dated January 1, 2022) including all addenda.

1.06 PROTECTION

A. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods or prevent cave-in or loose soil from falling into excavation.

B. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

C. Notify Engineer immediately of unexpected subsurface conditions. Confirm notification in writing. Discontinue work until Architect issues written notification to resume work.

D. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.

E. Grade excavation tip perimeter to prevent surface water runoff into excavation.

PART 2 PRODUCTS

2.01 MATERIALS

A. In accordance with the soil report the Construction Manager's testing agency representative shall determine if the excavated material is suitable for backfill. The suitable trench excavated material shall be used for trench backfill.

B. Provide all backfill materials from off site in accordance with Division 31 41 00 Section "Acceptance of Backfill"

C. Granular Fill Type A:
   1. Material for granular fill shall be Fine Aggregate in compliance with IDOT's "Standard Specifications for Road and Bridge Construction," January 1, 2022 Edition and with Division 31 Section "Acceptance of Backfill, Top Soil." The material shall be graded from coarse to fine.
   2. Bedding Material: Material for bedding shall be Coarse Aggregate in compliance with IDOT's "Standard Specifications for Road and Bridge Construction," January 1, 2022 Edition and with Division 31 Section "Acceptance of Backfill".

D. Fill Material Type D: Fill material shall be cohesive soil obtained from on-site required excavations and approved by the owner's testing agency representative as suitable backfill material in accordance with ASTM D 2487, Uniform Soils Classification System 1 and 703.5 and with Division 31 Section "Acceptance of Backfill." It shall be used to backfill excavations where the excavated material is unsuitable for backfill.

E. Fill Material Type E: Fill under landscaped areas shall be free from alkali, salt shall not exceed Appendix B, Section 742, Table A; Tiered Approach to Corrective Action objectives (Taco); Ill Adm .Code 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters and shall be obtained from on-site required excavations when conforming to the specifications. This fill shall be approved by the Construction Manager's testing agency representative as suitable material.

F. Fill Material Type X: Off-site borrow material shall comply to soil types GP, GW, SC and CL in accordance with ASTM D 2487, Uniform Soils Classification System and with Division 31 Section "Acceptance of Backfill, Top Soil." It shall be used where needed under structural slabs, roads, pavement and landscaped areas.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify stockpiled fill to be reused as approved in writing by the Construction manager and/or the owner's representative.

B. Verify foundation perimeter drainage installation has been inspected and approved in writing by Architect.

C. Verify and confirm in writing that areas to be backfilled are free of debris, snow, ice or water, and surfaces are not frozen.

3.02 PREPARATION

A. Identify specified lines, levels, contours and data.

B. Compact subgrade surfaces to density specified for backfill materials.

3.03 EXCAVATION

A. Cut trenches wide enough to enable utility installation and allow inspection.

B. Hand trim excavation and leave free of loose matter. Hand trim for bell and spigot pipe joints.

C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

D. Sides, walls or faces of all trenches shall be sloped and maintained in a safe manner and in the required condition until completion of backfilling. Excavations shall be braced or sloped in

compliance to the latest Occupational Safety and Health Administration (OSHA) requirements or as instructed by the testing agency on-site representative.

E. Locate and retain reusable excavated materials away from the edge of excavation.

3.04 BACKFILLING

A. Support pipes, and conduits during placement and compaction of bedding fill.

B. Backfill trenches to contours and elevations shown. Backfill systematically, as early as possible to allow maximum time for natural settlement. Do not backfill over porous, wet or spongy subgrade surfaces.

C. Place compact fill materials in continuous layers as specified in SSWSMCI.

D. Use a placement method that will not disturb or damage utilities in trenches, perimeter drainage.

E. Maintain optimum moisture content of backfill materials, determined by laboratory analysis, to obtain specified compaction density.

3.05 FILL TYPES AND COMPACTION

A. Compact all fill and backfill to specified values based on Modified Proctor Test in accordance with Sections 334200 “Storm Sewer System”.

3.06 COLD WEATHER PROTECTION

A. Quality Control Testing During Construction: An independent inspection and testing agency hired by Construction Manager, and employed by the owner’s Representative shall inspect and approve each subgrade and fill layer before further backfill and fill work is performed.
   1. The inspection and testing agency shall perform field and laboratory density tests in accordance with either ASTM D 1556 (sand cone method) and ASTM D 1557 as applicable.
   2. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922. The calibration curves shall be periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, the calibration curves furnished with the moisture gauges shall be checked in accordance with ASTM D 3017.
   3. If field tests are performed using nuclear methods, the inspection and testing agency shall make calibration checks on both density and moisture gauges at beginning of work, on each different type of material encountered, and at intervals as specified by the equipment manufacturer.
   4. If, in the opinion on the Construction Manager’s testing agency representative, based on the inspection and testing agency reports and inspections, subgrade or fills have been placed by specified density, the Contractor shall perform additional compaction and retesting until specified density contractor to pay for all retesting work.
   5. The Contractor shall assist the inspection and testing agency by providing access to the excavation and fill areas, and by removing loose materials from compacted soil layers prior to testing.

3.07 REMOVAL AND DISPOSAL

A. Remove surplus backfill materials and materials unsuitable for backfill from the site as per Division 31 Section 312318.11 Clean Construction or Demolition Debris Disposal and Section 31 23 18 Contaminated Soil, General Construction & Demolition Debris Disposal.

END SECTION

314100
ACCEPTANCE OF BACKFILL

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Fill or Backfill Material meeting the environmental analytical testing requirements of this Section as needed for the project.

B. Alternate Bid: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 RELATED WORK

A. Section 31 20 00 – Earth Moving.

1.04 DEFINITIONS

A. Agency means Illinois Environmental Protection Agency (IEPA).

B. Backfill means any granular or cohesive material used to fill excavation or bring property to design grade as specified in the project drawings and specifications.

C. Authorized Representative means the person designated as the official representative of the owner in connection with a project.

D. Top Soil means any soils placed to design grade and used to promote vegetative growth. All top soil shall not exceed Title 35: Environmental Protection Subtitle G: Waste Disposal Chapter I: Pollution Control Board Subchapter F: Risk Based Cleanup Objectives, Part 742, Tiered Approach To Corrective Action Objectives, Appendix B, Table A values for 35 ILL ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters.

1.05 SUBMITTALS

A. Environmental analytical test results of all backfill materials verifying that these materials do not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. A copy of the analytical results shall be submitted at least one week prior to depositing backfill on site. The date of the analysis shall be within 60 days of importing such material to the property.

B. Name and address and telephone number of the laboratory that will be used by the Contractor to perform the environmental analytical testing for backfill samples prior to starting work. The laboratory performing the analysis must be an IEPA accredited laboratory.

C. Copies of all daily reports, transport records and receipts to the Construction Manager on a daily basis.

1.06 SUBMITTAL REVIEW

A. Review of submittals or any comments made does not relieve the Contractor from compliance with the requirements of the drawings and specifications. The purpose of this check is to review for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; electing techniques of construction; coordinating the Work; and performing the Work in a safe and satisfactory manner.

PART 2 PRODUCTS

2.01 BACKFILL

A. The contractor shall supply only backfill that does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The date of the environmental analysis of any backfill shall be within 60 days of importing such material to a project property.

PART 3 EXECUTION

3.01 AUTHORIZATIONS

A. Haulers for transportation of backfill shall hold and present upon request a current, valid Commercial Driver's License (CDL).

3.02 MATERIAL SAMPLING

A. The Contractor shall collect sufficient amount of representative (no composite samples) backfill(s) for analytical testing sufficient to verify that these materials do not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. The contractor is responsible for payment of all backfill sampling and analytical fees.

B. The Construction Manager's Testing Agency or Construction Manager may collect backfill samples for laboratory analysis on behalf of the contractor at no additional cost to the project.

C. The Construction Manager's Testing Agency or Construction Manager may collect samples for laboratory analysis or field Photo-ionization Detector (PID) screening, or liquid samples for laboratory analysis. The Contractor shall provide the necessary equipment and manpower to assist the Construction Manager's Testing Agency or Construction Manager to collect materials to be sampled at no additional cost to the project and in compliance with OSHA and all other Rules and Regulations.

3.03 TRANSPORTATION

A. The Contractor shall provide and complete copies of all daily reports, weight tickets and receipts (as applicable) for transportation and ultimate placement of the backfill to the Construction Manager for review and signature within 5 business days or as directed by the owner's Representative.

3.04 BACKFILL

A. The backfill material shall be granular or cohesive material that meets the project specified requirements.

B. For each off-site source of backfill materials, the Contractor shall provide to the Construction Manager's Testing Agency or Construction Manager as required, environmental laboratory analyses and certification that the imported backfill does not exceed APPENDIX B, SECTION 742, TABLE A; TIERED APPROACH TO CORRECTIVE ACTION OBJECTIVES (TACO): 35 ILL. ADM. CODE 742 values for 35 ILL. ADM CODE 740 APPENDIX A Target Compound List (TCL) parameters. For samples from virgin sources, one representative sample mustbe analyzed for Appendix B, Section 742 Table A parameters. For samples from recycled sources, one sample per 1,000 tons of material must be analyzed for Appendix B, Section 742 Table A parameters. The date of the analysis of any backfill shall be within 60 days of importing such material to a school property.

C. The contractor shall not place backfill material without approval of the Construction Manager. If the Contractor backfills an excavation area without obtaining approval from the Construction Manager, the backfill materials shall be excavated, if required, at the Contractor's expense.

END SECTION

316329
DRILLED CONCRETE PIERS AND SHAFTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Dry-installed drilled piers.
2. Slurry displacement-installed drilled piers.
3. Dry-installed or slurry displacement-installed drilled piers at Contractor's choice.

1.02 UNIT PRICES

A. Drilled Piers: Actual net volume of drilled piers in place and approved. Actual length, shaft diameter, and bell diameter if applicable, may vary, to coincide with elevations where satisfactory bearing strata are encountered. These dimensions may also vary with actual bearing value of bearing strata determined by an independent testing and inspecting agency. Adjustments are made on net variation of total quantities, based on design dimensions for shafts and bells.
1. Base bids on indicated number of drilled piers and, for each pier, the design length from top elevation to bottom of shaft, extended through the bell, if applicable, and the diameter of shaft and bell.
2. Unit prices include labor, materials, tools, equipment, and incidentals required for excavation, trimming, shoring, casings, dewatering, reinforcement, concrete fill, testing and inspecting, and other items for complete drilled-pier installation.

B. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed outside dimensions of drilled piers cast against rock. Unit prices for rock excavation include replacement with approved materials.

C. Trial Drilled Pier: Same unit price as indicated for drilled pier, including backfilling.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**]<**Insert location**>.
1. Review methods and procedures related to drilled piers including, but not limited to, the following:
a. Review geotechnical report.
b. Discuss existing utilities and subsurface conditions.
c. Review coordination with temporary controls and protections.
d. Review measurement and payment of unit prices.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternative design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Shop Drawings: For concrete reinforcement, detailing fabricating, bending, supporting, and placing.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer **[land surveyor][professional engineer][and][testing agency]**.

B. Welding certificates.

C. Material Certificates: From manufacturer, for the following:
1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.

D. Material Test Reports: For each material below, by a qualified testing agency:

E. Aggregates:[**Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.**]

F. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

A. Record drawings.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer that has specialized in drilled-pier work.

B. Testing Agency Qualifications: Qualified according to ASTM C1077, ASTM D3740, and ASTM E329 for testing indicated.

C. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.08 TRIAL DRILLED PIER

A. Trial Drilled Pier: Construct trial drilled pier of diameter and depth and at location indicated or, if not indicated, of same diameter and depth as largest drilled piers, located at least three diameters clear of permanent drilled piers, to demonstrate Installer's construction methods, equipment, standards of workmanship, and tolerances.
1. Install reinforcement, fill with concrete, remove temporary casings, and terminate trial drilled pier **24 inches** below subgrade and leave in place.
2. Install permanent casings, excavate bell, excavate rock socket, and place slurry, as required for permanent drilled piers.
3. If Architect determines that trial drilled pier does not comply with requirements, excavate for and cast another until it is accepted.

1.09 FIELD CONDITIONS

A. Existing Utilities: Locate existing underground utilities before excavating drilled piers. If utilities are to remain in place, provide protection from damage during drilled-pier operations.
1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.

B. Interruption of Existing Utilities: Do not interrupt any utility to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
1. Notify [**Architect**][**Owner**] no fewer than [**two**]<**Insert number**> days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without [**Architect's**][**Owner's**] written permission.

C. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from this data.
1. Make additional test borings and conduct other exploratory operations necessary for drilled piers.
2. The geotechnical report is [**included**][**referenced**] elsewhere in the Project Manual.

D. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.

1. Record and maintain information pertinent to each drilled pier and indicate on record Drawings. Cooperate with Owner's testing and inspecting agency to provide data for required reports.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Drilled-Pier Standard: Comply with ACI 336.1 except as modified in this Section.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, **Grade 60**, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.

C. Galvanized Reinforcing Bars: [**ASTM A615/A615M, Grade 60**][**ASTM A706/A706M**], deformed bars, ASTM A767/A767M, [**Class I**][**Class II**] zinc coated after fabrication and bending.

D. Epoxy-Coated Reinforcing Bars: [**ASTM A615/A615M, Grade 60**][**ASTM A706/A706M**], deformed bars, [**ASTM A775/A775M**][**or**][**ASTM A934/A934M**], epoxy coated, with less than 2 percent damaged coating in each **12-inch** bar length.

E. Plain and Deformed Steel Wire: ASTM A1064/A1064M, [**as drawn**][**galvanized**].

F. Epoxy-Coated Wire: ASTM A884/A884M, Class A, Type 1 coated, [**as-drawn, plain**][**deformed**]-steel wire, with less than 2 percent damaged coating in each **12-inch** wire length.

G. Joint Dowel Bars: ASTM A615/A615M, **Grade 60**, plain. Cut bars true to length with ends square and free of burrs.

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C150/C150M, [**Type I**][**Type II**][**Type I/II**][**Type III**][**Type V**].[**Supplement with the following:**]
      a. Fly Ash: ASTM C618, [**Class C**][**Class F**].
      b. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
   2. Blended Hydraulic Cement: ASTM C595/C595M, [**Type IS, portland blast-furnace slag**][**Type IP, portland-pozzolan**][**Type I (PM), pozzolan-modified portland**][**Type I (SM), slag-modified portland**] cement.

B. Normal-Weight Aggregate: ASTM C33/C33M, graded, [**3/4-inch-**]<**Insert dimension**> nominal maximum coarse-aggregate size. Provide aggregate from a single source[**with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials**].
   1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C94/C94M[**and potable**].

D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that do 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 C494/C494M, Type A.
   2. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
   3. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
   4. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
   5. **<Insert admixture>**.

E. Sand-Cement Grout: Portland cement, ASTM C150/C150M, Type II; clean natural sand, ASTM C404; and water to result in grout with a minimum 28-day compressive strength of **1000 psi**, of consistency required for application.

2.04 STEEL CASINGS

A. Steel Pipe Casings: ASTM A283/A283M, Grade C, or ASTM A36/A36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1/D1.1M.

B. Corrugated-Steel Pipe Casings: ASTM A929/A929M, steel sheet, zinc coated.

C. Liners: Comply with ACI 336.1.

2.05 SLURRY

A. Slurry: [**Pulverized bentonite**][**pulverized attapulgite**][**or**][**polymers**] mixed with water to form stable colloidal suspension; complying with ACI 336.1 for density, viscosity, sand content, and pH.

2.06 CONCRETE MIXTURES

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**.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to **ACI 301** limits as if concrete were exposed to deicing chemicals.

C. Limit water-soluble, chloride-ion content in hardened concrete to [**0.15**][**0.30**] percent by weight of cement.

D. Proportion normal-weight concrete mixture as follows:
1. Compressive Strength (28 Days): [**6000 psi**][**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<Insert value>.
2. Maximum Water-Cementitious Materials Ratio: [**0.50**][**0.45**][**0.40**]<**Insert ratio**>.
3. Minimum Slump: Capable of maintaining the following slump until completion of placement:
   a. **4 inches** for dry, uncased, or permanent-cased drilling method.
   b. **6 inches** for temporary-casing drilling method.
   c. **7 inches** for slurry displacement method.
4. Air Content: Do not air entrain concrete.

2.07 REINFORCEMENT FABRICATION

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.08 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, 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.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by drilled-pier operations.

3.02 EXCAVATION

A. Unclassified Excavation: Excavate to bearing elevations regardless of character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
1. Obstructions: Unclassified excavation may include removal of unanticipated boulders, concrete, masonry, or other subsurface obstructions. No changes in the Contract Sum or the Contract Time are authorized for removal of obstructions.
2. Obstructions: Unclassified excavated materials may include removal of unanticipated boulders, concrete, masonry, or other subsurface obstructions. Payment for removing obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets, or underreaming tools attached to drilling equipment of size, power,

torque, and downthrust necessary for the Work is according to Contract provisions for changes in the Work.

B. Classified Excavation: Excavation is classified as standard excavation, special excavation, and obstruction removal and includes excavation to bearing elevations as follows:
   1. Standard excavation includes excavation accomplished with conventional augers fitted with soil or rock teeth, drilling buckets, or underreaming tools attached to drilling equipment of size, power, torque, and downthrust necessary for the Work.
   2. Special excavation includes excavation that requires special equipment or procedures where drilled-pier excavation equipment used in standard excavation, operating at maximum power, torque, and downthrust, cannot advance the shaft.
      a. Special excavation requires use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation.
      b. Earth seams, rock fragments, and voids included in rock excavation area are considered rock for full volume of shaft from initial contact with rock.
   3. Obstructions: Payment for removing unanticipated boulders, concrete, masonry, or other subsurface obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets, or underreaming tools attached to drilling equipment of size, power, torque, and downthrust necessary for the Work is according to Contract provisions for changes in the Work.

C. Prevent surface water from entering excavated shafts. Conduct water to site drainage facilities.

D. Excavate shafts for drilled piers to indicated elevations. Remove loose material from bottom of excavation.
   1. Excavate bottom of drilled piers to level plane within 1:12 tolerance.
   2. Remove water from excavated shafts before concreting.
   3. Excavate rock sockets of dimensions indicated.
   4. Cut series of grooves about perimeter of shaft to height from bottom of shaft, vertical spacing, and dimensions indicated.

E. Notify and allow testing and inspecting agency to test and inspect bottom of excavation. If unsuitable bearing stratum is encountered, make adjustments to drilled piers as determined by Architect.
   1. Do not excavate shafts deeper than elevations indicated unless approved by Architect.
   2. Payment for additional authorized excavation is according to Contract provisions for changes in the Work.

F. End-Bearing Drilled Piers: Probe with auger to a depth below bearing elevation, equal to diameter of the bearing area of drilled pier. Determine whether voids, clay seams, or solution channels exist.
   1. Test first three drilled piers and one of every six drilled piers thereafter.
   2. Fill augur-probe holes with grout.

G. End-Bearing Drilled Piers: Probe with auger to a depth of **96 inches** below bottom elevation of shaft, and visually inspect and classify soil. Verify continuity and thickness of strata.
   1. Test first three drilled piers and one of every six drilled piers thereafter.

H. Excavate shafts for closely spaced drilled piers and for drilled piers occurring in fragile or sand strata only after adjacent drilled piers are filled with concrete and allowed to set.

I. Slurry Displacement Method: Stabilize excavation with slurry maintained a minimum of **60 inches** above ground-water level and above unstable soil strata to prevent caving or sloughing of shaft. Maintain slurry properties before concreting.
   1. Excavate and complete concreting of drilled pier on same day, or redrill, clean, and test slurry in excavation before concreting.

J. Temporary Casings: Install watertight steel casings of sufficient length and thickness to prevent water seepage into shaft; to withstand compressive, displacement, and withdrawal stresses; and to maintain stability of shaft walls.

1. Remove temporary casings, maintained in plumb position, during concrete placement and before initial set of concrete[**, or leave temporary casings in place**].

K. Bells: Excavate bells for drilled piers to shape, base thickness, and slope angle indicated. Excavate bottom of bells to level plane and remove loose material before placing concrete.
1. Shore bells in unstable soil conditions to prevent cave-in during excavation, inspection, and concreting.

L. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.
1. If location or out-of-plumb tolerances are exceeded, provide corrective construction. Submit corrective construction proposals to Architect for review before proceeding.

3.03 PERMANENT STEEL CASING INSTALLATION

A. Install permanent steel casings of minimum wall thickness indicated and of diameter not less than diameter of drilled pier.
1. Install casings as excavation proceeds, to maintain sidewall stability.
2. Fabricate bottom edge of lowest casing section with cutting shoe capable of penetrating rock and achieving water seal.
3. Connect casing sections by continuous penetration welds to form watertight, continuous casing.
4. Remove and replace or repair casings that have been damaged during installation and that could impair strength or efficiency of drilled pier.
5. Fill annular void between casing and shaft wall with grout.

B. Corrugated-Steel Casings: Provide corrugated-steel casings formed from zinc-coated steel sheet.
1. Corrugated casings may be delivered in sections or panels of convenient length and field connected according to manufacturer's written instructions.

3.04 STEEL REINFORCEMENT INSTALLATION

A. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.

C. Fabricate and install reinforcing cages symmetrically about axis of shafts in a single unit.

D. Accurately position, support, and secure reinforcement against displacement during concreting. Maintain minimum cover over reinforcement.

E. Use templates to set anchor bolts, leveling plates, and other accessories furnished in work of other Sections. Provide blocking and holding devices to maintain required position during final concrete placement.

F. Protect exposed ends of extended reinforcement, dowels, or anchor bolts from mechanical damage and exposure to weather.

3.05 CONCRETE PLACEMENT

A. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by a qualified [**Special Inspector**][**testing agency**].
1. Construct a construction joint if concrete placement is delayed more than one hour. Level top surface of concrete[**and insert joint dowel bars**]. Before placing remainder of concrete, clean surface laitance, roughen, and slush concrete with commercial bonding agent or with sand-cement grout mixed at ratio of 1:1.

B. Dry Method: Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement.
1. Where concrete cannot be directed down shaft without striking reinforcement, place concrete with chutes, tremies, or pumps.
2. Vibrate top **60 inches** of concrete.

C. Slurry Displacement Method: Place concrete in slurry-filled shafts by tremie methods or pumping. Control placement operations to ensure that tremie or pump pipe is embedded no less than **60 inches** into concrete and that flow of concrete is continuous from bottom to top of drilled pier.

D. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a **60-inch** head of concrete above bottom of casing.
   1. Vibrate top **60 inches** of concrete after withdrawal of temporary casing.

E. Screed concrete at cutoff elevation level and apply scoured, rough finish. Where cutoff elevation is above the ground elevation, form top section above grade and extend shaft to required elevation.

F. Protect concrete work, according to **ACI 301**, from frost, freezing, or low temperatures that could cause physical damage or reduced strength.
   1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   2. Do not use calcium chloride, salt, or other mineral-containing antifreeze agents or chemical accelerators.

G. If hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to **ACI 301** to maintain delivered temperature of concrete at no more than **90 deg F**.
   1. Place concrete immediately on delivery. Keep exposed concrete surfaces and formed shaft extensions moist by fog sprays, wet burlap, or other effective means for a minimum of seven days.

3.06 FIELD QUALITY CONTROL

A. Special Inspections: [**Owner will engage**][**Engage**] a qualified special inspector to perform the following special inspections:
   1. Drilled piers.
   2. Excavation.
   3. Concrete.
   4. Steel reinforcement welding.
   5. <**Insert special inspections**>.

B. Testing Agency: [**Owner will engage**][**Engage**] a qualified testing agency to perform tests and inspections.

C. Drilled-Pier Tests and Inspections: For each drilled pier, before concrete placement.
   1. Soil Testing: Bottom elevations, bearing capacities, and lengths of drilled piers indicated have been estimated from available soil data. Actual elevations and drilled-pier lengths and bearing capacities are determined by testing and inspecting agency. Final evaluations and approval of data are determined by Architect.
      a. Bearing Stratum Tests: Testing agency takes undisturbed [**hardpan**][**rock**] core samples from drilled-pier bottoms; tests each sample for compression, moisture content, and density; and reports results and evaluations.

D. Concrete Tests and Inspections: ASTM C172/C172M except modified for slump to comply with ASTM C94/C94M.
   1. Slump: ASTM C143/C143M; one test at point of placement for each compressive-strength test but no fewer than one test for each concrete load.
   2. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is **40 deg F** and below and **80 deg F** and above, and one test for each set of compressive-strength specimens.
   3. Compression Test Specimens: ASTM C31/C31M; one set of four standard cylinders for each compressive-strength test unless otherwise indicated. Mold and store cylinders for laboratory-cured test specimens unless field-cured test specimens are required.
   4. Compressive-Strength Tests: ASTM C39/C39M; one set for each drilled pier but not more than one set for each truck load. Test one specimen at seven days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.

5. If frequency of testing provides fewer than five strength tests for a given class of concrete, conduct tests from at least five randomly selected batches or from each batch if fewer than five are used.
6. If strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor is to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
7. Strength of each concrete mixture is 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**.
8. Report test results in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. List Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests in reports of compressive-strength tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency to make additional tests of concrete if test results indicate that slump, compressive strengths, or other requirements have not been met, as directed by Architect.
    a. Continuous coring of drilled piers may be required, at Contractor's expense, if temporary casings have not been withdrawn within specified time limits or if observations of placement operations indicate deficient concrete quality, presence of voids, segregation, or other possible defects.
11. Perform additional testing and inspecting, at Contractor's expense, 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. An excavation, concrete, or a drilled pier will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports for each drilled pier as follows:
1. Actual top and bottom elevations.
2. Actual drilled-pier diameter at top, bottom, and bell.
3. Top of rock elevation.
4. Description of soil materials.
5. Description, location, and dimensions of obstructions.
6. Final top centerline location and deviations from requirements.
7. Variation of shaft from plumb.
8. Shaft excavating method.
9. Design and tested bearing capacity of bottom.
10. Depth of rock socket.
11. Levelness of bottom and adequacy of cleanout.
12. Properties of slurry and slurry test results at time of slurry placement and at time of concrete placement.
13. Ground-water conditions and water-infiltration rate, depth, and pumping.
14. Description, purpose, length, wall thickness, diameter, tip, and top and bottom elevations of temporary or permanent casings. Include anchorage and sealing methods used and condition and weather tightness of splices if any.
15. Description of soil or water movement, sidewall stability, loss of ground, and means of control.
16. Bell dimensions and variations from original design.
17. Date and time of starting and completing excavation.

18. Inspection report.
19. Condition of reinforcing steel and splices.
20. Position of reinforcing steel.
21. Concrete placing method, including elevation of consolidation and delays.
22. Elevation of concrete during removal of casings.
23. Locations of construction joints.
24. Concrete volume.
25. Concrete testing results.
26. Remarks, unusual conditions encountered, and deviations from requirements.
27. <**Insert requirement**>.

3.07 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END SECTION

316613
HELICAL ANCHOR PILING

PART 1 GENERAL

1.01 SUMMARY

A. This work consists of furnishing all necessary engineering and design services, supervision, labor, tools, materials, and equipment to perform all work necessary to install the Helical Piles per the specifications described herein. The Contractor shall install Helical Piles that will develop the load capacities and at the locations detailed in the Plans. This work shall also include load testing to verify Helical Pile capacity and deflection. Contractor shall be responsible for determining actual length of Helical Pile required to develop load capacities detailed in the Plans.

B. Related Sections:
   1. Section 01 40 00 "Testing and Inspections" for administrative and procedural requirements for the testing and inspection of materials.
   2. Section 01 41 00 “Testing Agency Services” for information on required site inspections and tests.

1.02 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Include plans, elevations, sections, and attachment details.
   2. Detail fabrication and assembly of pile components. Include all connections, beam bracket, diagonal anchor tab pile top attachment, and corrosion protection as appropriate. Identify Helical Pile lead/starter and extension section (manufacturer’s catalog numbers).
   3. The shop drawings shall include the following:
      a. Helical Pile number, location and pattern by assigned identification number.
      b. Helical Pile design load.
      c. Type and size of central steel shaft.
      d. Helix configuration (number and diameter of helix plates).
      e. Minimum effective installation torque.
      f. Minimum overall length.
      g. Inclination of Helical Pile.
      h. Cut-off elevation.
      i. Helical Pile attachment to structure.

C. Calibration Report: Submit prior to pile installation and testing.

D. Static pile Test Report: Submit within three days of installing pile.

E. Delegated-Design Submittal: For pile design capacities based on soil conditions showing effective safety factor.

1.04 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product test reports.

C. Certified Mill Test Reports: For the central steel shaft, as the material is delivered, to the Owner for record purposes. The ultimate strength, yield strength, percent elongation, and chemistry composition shall be provided.

D. Construction Procedure: Detailed description of the installation procedures including a complete list of major equipment to be used.

E. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: The Helical Pile Contractor shall be experienced in performing design and construction of Helical Piles and shall furnish all materials, labor, and supervision to perform the work. The Contractor shall be trained and certified in the proper methods of design and installation of Helical Piles. The Contractor shall provide names of on-site personnel materially involved with the work, including those who carry documented certification. At a minimum, these personnel shall include foreman, machine operator, and project engineer/manager.

B. The Helical Pile Contractor shall not sublet the whole or any part of the contract without the express written permission of the Owner.

C. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel."

1.06 CALIBRATION

A. The Contractor shall submit to the Owner copies of calibration reports for each torque indicator or torque motor, and all load test equipment to be used on the project. The calibration tests shall have been performed within forty-five (45) working days of the date submitted. Helical Pile Installation and testing shall not proceed until the Owner has received the calibration reports. These calibration reports shall include, but are not limited to, the following information:
   1. Name of project and Contractor.
   2. Name of testing agency.
   3. Identification (serial number) of device calibrated.
   4. Description of calibrated testing equipment.
   5. Date of calibration.
   6. Calibration data.

1.07 PRECONSTRUCTION TESTING

A. One static load test per ASTM D 1143 Standard Test Methods for Deep Foundations Under Static Axial Compressive Load, Procedure A will be required. The Contractor shall submit plan for production testing of the Helical Piles to the Owner for review and acceptance prior to beginning load test. The purpose of the test is to determine the load versus displacement response of the Helical Pile and provide an estimation of ultimate capacity.

1.08 FIELD CONDITIONS

A. Protect structures, underground utilities, and other construction from damage caused by pile installation.

B. Site Information: A geotechnical report has been prepared for this Project and is for information only. The Geotechnical Report, including logs of the soil borings, shall be considered representative of the in-situ subsurface conditions likely to be encountered on the project site. The Geotechnical Report shall be used as the basis for the Helical Pile design using generally accepted engineering judgment and methods.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified structural engineer, currently licensed in the state of Illinois to design Helical Piles.
   1. Each pile shall withstand compressive load indicated in drawings with a safety factor as follows:
      a. 2.0 when load tests are performed prior to installation.
      b. 3.0 when preinstallation tests are not performed. Note one test during construction is required.

B. Allowable Tolerances

1. Centerline of Helical Piles shall not be more than three (3) inches from indicated plan location.
2. Helical Pile plumbness shall be within 3 degrees of design alignment.
3. Top elevation of Helical Pile shall be within +1 inch to –1 inches of the design vertical elevation.

2.02 HELICAL PILES

A. Helical Piles: Helical anchors, brackets and connections.
   1. Central Steel Shaft: The central shaft shall consist of a high strength structural steel tube meeting the requirements of ASTM A513.
   2. Helix Bearing Plate: One or more helical bearing plates shall be affixed to the central shaft. Helical bearing plates shall be attached to central shafts via fillet welds continuous on top and bottom and around the leading edges. Helical bearing plates shall be cold pressed into a near perfect helical shape that when affixed to the central shaft are perpendicular with the central shaft, of uniform pitch, and such that the leading and trailing edges are within 3/8 inch of parallel. Average helical pitch shall be within plus or minus 1/4 inch of the thickness of the helical bearing plate plus 3 inches.
   3. Shaft Connections: The Helical Pile and Helical Anchor shaft connections shall consist of an external sleeve connection or a welded connection. External sleeve connections shall be in-line, straight and rigid and shall have a maximum tolerable slack of 1/16-inch. Welded connections shall consist of a full penetration groove weld all-around the central shaft. Shaft connections shall have a flexural strength at least as great as the shaft itself.
   4. Bolts: Bolt holes through the external sleeve and central shaft shall have a diameter that is 1/16th inch greater than the bolt diameter. Bolts and nuts used to join Helical Pile and Helical Anchor sections at the shaft connections shall be bare steel, epoxy coated, or zinc coated to match the corrosion protection used for the central shaft. All Helical Pile and Helical Anchor bolts shall be securely snug tightened.
   5. Couplings: Couplings shall be capable of transmitting both the maximum installation torque from the tool string to the helix plates, and the maximum axial load from the top of the pile to the helical bearing plates.
   6. Plug Welds: Alternatively, external sleeve connections may be made using plug welds matching the diameter and number of bolt holes.
   7. External sleeve: External sleeve Helical Pile and Helical Anchor shaft connections shall consist of a high strength structural steel tube outer sleeve meeting the requirements of ASTM A513. The outer sleeve shall be welded to the central shaft via a continuous fillet weld all-around. The fillet weld shall have a throat thickness equal to the external sleeve tube thickness.

B. Helical Piles and Helical Anchors shall be fitted with a manufactured Bracket that facilitates connection to the structure. Brackets shall be rated for the design loads shown on the Drawings. Brackets shall be affixed to the end of Helical Piles and Helical Anchors via bolts, plug welds, or continuous penetration welds meeting the requirements for shaft connections given previously in these specifications

C. Corrosion Protection: All Helical Piles and Fabricated Accessories shall be hot-dipped galvanized after fabrication (per ASTM A123 or A153 as applicable).

2.03 ACCESSORIES

A. All components and accessories shall be produced by the same manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Conditions: Do not start pile installation operations until earthwork fills have been completed or excavations have reached an elevation of 6 to 12 inches above bottom of footing or pile cap.

3.02 INSTALLATION

A. General: Continuously install piles to elevations or penetration resistance established by static load test.

B. The helical pile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.

C. The lead section shall be positioned at the location as shown on the shop drawings. The helical pile sections shall be engaged and advanced into the soil in a smooth, continuous manner at a rate of rotation of not to exceed 16 RPM's. The extension sections shall be provided to obtain the required minimum overall length and installation torque as shown on the shop drawings. Connect sections together using coupling bolt(s) and nut torqued to 40 ft-lb.
   1. Sufficient down pressure shall be applied to uniformly advance the helical pile sections approximately 3 inches per revolution. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths.

D. Allowable Installation Tolerances
   1. Centerline of Helical Piles shall not be more than three (3) inches from indicated plan location.
   2. Helical Pile plumbness shall be within 2 degrees of design alignment.
   3. Top elevation of Helical Pile shall be within +1 inch to –1 inches of the design vertical elevation.

E. Termination Criteria
   1. The torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.
   2. The minimum installation torque and minimum overall length criteria as shown on the technical submittal shall be satisfied prior to terminating the helical pile foundation installation.
   3. If the torsional strength rating of the central steel shaft and has been reached prior to achieving the minimum overall length required, the Contractor shall have the following options:
      a. Terminate the installation at the depth obtained subject to the review and acceptance of the Owner, or:
      b. Remove the existing helical pile and install a new one with fewer and/or smaller diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Owner.
   4. If the minimum installation torque as shown on the working drawings is not achieved at the minimum overall length, and there is no maximum length constraint, the Contractor shall have the following options:
      a. Install the helical pile deeper using additional extension sections, or:
      b. Remove the existing helical pile and install a new one with additional and/or larger diameter helix plates.
      c. De-rate the load capacity of the helical pile and install additional helical screw foundation(s). The de-rated capacity and additional helical screw foundation location shall be subject to the review and acceptance of the Owner.
   5. If the helical pile is refused or deflected by a subsurface obstruction, the installation shall be terminated and the pile removed. The obstruction shall be removed, if feasible, and the helical pile re-installed. If the obstruction can't be removed, the helical pile shall be installed at an adjacent location, subject to review and acceptance of the Owner.
   6. If the torsional strength rating of the central steel shaft and has been reached prior to proper positioning of the last plain extension section relative to the final elevation, the Contractor may remove the last plain extension and replace it with a shorter length extension. If it is not feasible to remove the last plain extension, the Contractor may cut said extension shaft to the correct elevation. The Contractor shall not reverse (back-out) the helical pile to facilitate extension removal.
   7. The average torque for the last three feet of penetration shall be used as the basis of comparison with the minimum installation torque as shown on the working drawings. The

average torque shall be defined as the average of the last three readings recorded at one-foot intervals.

F. Installation Records: Maintain accurate installation records as indicated in Field Quality Control Section.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:
   1. Static Load test: One (1) static load test per site, per ASTM D 1143 Standard Test Methods for Deep Foundations Under Static Axial Compressive Load, Procedure A will be required during installation. The Contractor shall submit plans for production testing of the Helical Piles to the Owner for review and acceptance prior to beginning load test. The purpose of the test is to determine the load versus displacement response of the Helical Pile and provide an estimation of ultimate capacity.
   2. Inspect the pile installation and record the following information:
      a. Name of project and Contractor.
      b. Name of Contractor's supervisor during installation.
      c. Date and time of installation.
      d. Name and model of installation equipment.
      e. Type of torque indicator used.
      f. Location of Helical Pile by assigned identification number.
      g. Actual Helical Pile type and configuration – including lead section (number and size of helix plates), number and type of extension sections (manufacturer's SKU numbers).
      h. Helical Pile installation duration and observations.
      i. Total length of installed Helical Pile.
      j. Cut-off elevation.
      k. Inclination of Helical Pile.
      l. Installation torque at one-foot intervals for the final 10 feet.
      m. Comments pertaining to interruptions, obstructions, or other relevant information.
      n. Rated load capacities.

C. Piles will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END SECTION

320200
AGGREGATE

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Responsible for all work in this section.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor, the Plumbing Prime Contractor, the Heating Prime Contractor, and the Electrical Prime Contractor, each in their respective disciplines.

1.03 SUMMARY

A. Section Includes:
   1. Coarse aggregate materials.
   2. Fine aggregate materials.

1.04 REFERENCES

A. American Society for Testing and Materials, (ASTM):
   1. ASTM C136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   2. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/cu ft) (600 kN-m/cu m)).
   3. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/cu ft (2,700 kN-m/cu m)).
   4. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   5. ASTM D2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   6. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   7. ASTM D3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   8. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. IDOT - Standard Specifications for Road and Bridge Construction, latest edition.

1.05 SUBMITTALS

A. Samples: Submit, in air-tight containers, 10 lb. (4.5 kg) sample of each type of Types A1, A2, and A3 fill to testing laboratory.

B. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer approval. Certify aggregates meet or exceed special requirements.

1.06 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

PART 2 PRODUCTS

2.01 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1: Free draining coarse stone, crushed gravel; Angular crushed natural stone; free of shale, clay, friable material and debris; graded in accordance with ASTM

C136, within the following limits and shall meet the physical requirements for Coarse Aggregate (Class B), Grade CA-7, of Section 1004 of the IDOT Specifications:

Sieve Size	Percent Passing
1-1/2 inches (38 mm)	100
1 inch (25 mm)	90 to 100
1/2 inch (13 mm)	30 to 60
No. 4 (4.75 mm)	0 to 10

B. Coarse Aggregate Type A2: Coarse stone or gravel, angular crushed natural stone; free of shale, friable material and debris; graded in accordance with ASTM C136, within the following limits and meet the physical requirements for Coarse Aggregate (Class B),Grade CA-6 of Section 1004 of the IDOT Specifications:

Sieve Size	Percent Passing
1-1/2 inches (38 mm)	100
1 inch (25 mm)	90 to 100
1/2 inch (13 mm)	60 to 90
No. 4 (4.75 mm)	30 to 56
No. 16 (1.18 mm)	10 to 40
No. 200 (75 micro m)	4 to 12

2.02 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type A3 (Sand): Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136; within the following limits and meet the physical requirements for Fine Aggregate, Grade FA-2 of Section 1003 of the IDOT Specifications.

Sieve Size	Percent Passing
3/8 inch (9.5 mm)	100
No. 4 (4.75 mm)	94 to 100
No. 16 (1.18 mm)	45 to 85
No. 50 (300 micro m)	10 to 30

2.03 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Testing and inspection services.

B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557 and ASTM C136.

C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557 and ASTM C136.

D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 STOCKPILING

A. Stockpile materials on site at locations designated by Engineer.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate different aggregate materials with dividers or stockpile apart to prevent mixing.

D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.02 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.

END SECTION

321100
AGGREGATE BASE

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Aggregate base course below pavement or slab on grade.

B. Alternate Bid: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 RELATED WORK

A. Section 32 02 00 – Aggregate

1.04 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).
   2. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   3. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   4. ASTM D3017 - Test Methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse Aggregate Fill Type A2.

B. Fine Aggregate (Sand) Fill Type A3

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.02 PREPARATION

A. Perform proof roll testing of exposed substrate in the presence of Construction Manager, User Agency's Representative and Architect/Engineer using fully loaded haul truck prior to placing bottom layer of aggregate base to identify any soft spots or unsuitable material

B. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re compacting.

C. Do not place aggregate base on soft, wet, muddy, or frozen surfaces, or in standing water.

3.03 AGGREGATE PLACEMENT

A. Spread aggregate evenly over prepared substrate to a total layer thickness as specified.

B. Compact each aggregate layer to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Use mechanical tamping equipment in areas inaccessible to heavy compaction equipment, or where necessary to avoid damage to structures, foundations, utilities, or other facilities.

3.04 TOLERANCES

A. Maximum Variation from Flat Surface: 1/2 inch (12 mm) measured with 10 ft (3 m) straight edge.

B. Maximum Variation From Thickness: 1/4 inch (6 mm).

C. Maximum Variation From Elevation: 1/2 inch (12 mm).

3.05 FIELD QUALITY CONTROL

A. The Construction Manager will furnish testing and inspection services during earthwork operations. Such services will include general inspections of earthwork operations, testing of fill materials and compaction, and inspection of excavations to such extent as determined by Project Engineer.

B. Testing: In accordance with ASTM D2922. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at no additional cost to User Agency.

C. Frequency of Tests: One test for every 5,000 sq. ft. of area with a minimum of 2 tests per layer.

3.06 SCHEDULES

A. Under Pavements:
   1. Compact placed aggregate materials with a layer thickness not exceeding 6 inches to achieve compaction to 95 percent of Modified Proctor test.

B. Under Slab on Grade:
   1. Compact placed aggregate materials with a layer thickness not exceeding 6 inches to achieve compaction to 95 percent of Modified Proctor test.

END SECTION

321200
ASPHALT PAVING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Hot-mix asphalt surface and binder course.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 SUBMITTALS

A. Product Data: For each type of product.
   1. Include technical data and tested physical and performance properties.

B. Shop Drawings: For Pavement Markings.
   1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
   2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.04 RELATED WORK

A. Section 32 11 00 – Aggregate Base

1.05 REFERENCES

A. Illinois Department of Transportation – Standard Specifications for Road and Bridge Construction (SSRBC), January 1, 2022 edition.

B. Asphalt Institute:
   1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mixes.
   2. AI MS-19 - Basic Asphalt Emulsion Manual.

C. American Society for Testing and Materials:
   1. ASTM D946 - Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
   2. ASTM D3381 - Specification for Viscosity Graded Asphalt Cement for Use in Pavement Construction.

1.06 SUBMITTALS

A. Product Data: For each type of product.
   1. Submit name of proposed material source and product data including mix design, component properties, and component aggregate gradations.
   2. Include technical data and tested physical and performance properties.

B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

C. Shop Drawings: For Pavement Markings.
   1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
   2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with State of Illinois Department of Transportation– Standard Specifications for Road and Bridge Construction (SSRBC), January 1, 2022 edition.

B. Comply with materials, workmanship, and other applicable requirements of IDOT for pavement-marking work.

C. Obtain materials from same source throughout.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not place hot-mix asphalt during rain or snow.

B. Do not place hot-mix asphalt binder course when the ambient air temperature in the shade is less than 40 °F (5 °C).

C. Do not place hot-mix asphalt surface course when the ambient air temperature in the shade is less than 45 °F (8 °C).

PART 2 PRODUCTS

2.01 MATERIALS

A. Hot-mix asphalt: in accordance with IDOT Standard Specifications, Section 1030.

B. Aggregate for binder course mix: in accordance with IDOT Standard Specifications, Section 1030, January 2022 Edition.

C. Aggregate for surface course mix: in accordance with IDOT Standard Specifications, Section 1030, January 2022 Edition.

D. Primer, type/grade MC-30 for use on aggregate base: in accordance with IDOT Standard Specifications, Section 1032, January 2022 Edition.

E. Primer, type/grade SS-1, SS-1h, CSS-1, CSS-1h, HFE 90, RC-70, SS-1hP, or CSS-1hP for use on hot-mix asphalt binder course (if required): in accordance with IDOT Standard Specifications, Section 1032, January 2022 Edition.

2.02 HOT-MIX ASPHALT PAVING MIX

A. Use dry material to avoid foaming. Mix uniformly.

B. Binder course: Hot-Mix Asphalt Binder Course, IL-19.0, N50 in accordance with IDOT Standard Specifications, Section 406, January 2022 Edition.

C. Surface course: Hot-Mix Asphalt Surface Course, Mix “D”, N50 (IL 9.5 mm) in accordance with IDOT Standard Specifications, Section 406, January 2022 Edition.

2.03 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N; colors complying with FS TT-P-1952.

B. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.

C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

D. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.

2.04 SOURCE QUALITY CONTROL AND TESTS

A. Submit proposed mix design of each type of hot-mix asphalt for review prior to beginning of work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base course are correct.

C. Verify gutter drainage grilles and frames and manhole frames and lids are installed in correct position and elevation.

D. Prior to applying pavement markings, verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

E. Proceed with pavement marking only after unsatisfactory paving conditions have been corrected.

3.02 BASE COURSE

A. Aggregate Base Course: Install as specified in Section 32 11 00

3.03 PREPARATION - PRIMER

A. Apply primer in accordance with IDOT Standard Specifications, Article 406.05(b), January 2022 Edition.

B. Apply primer to aggregate base at a uniform rate of 0.50 gal/sq yd (2.3 L/sq m).

C. Apply primer to contact surfaces of curbs and gutters.

D. Do not apply primer to the surfaces of utility structures within the pavement area.

E. Use clean sand to blot excess, pooling primer.

3.04 PLACING HOT-MIX ASPHALT PAVEMENT

A. Hot-mix asphalt binder course shall be placed on a clean, dry base.

B. Place hot-mix asphalt binder course at least 24 hours after the application of primer.

C. Place hot-mix asphalt binder course with a minimum 2-1/4 inch compacted lift thickness, or greater if shown on the Project Drawings, in accordance with IDOT Standard Specifications, Section 406, January 2022 Edition.

D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Only hand compact in areas inaccessible to rolling equipment. Perform rolling with consecutive passes to achieve an even and smooth finish without roller marks.

E. Place hot-mix asphalt surface course within 2 hours of placing and compacting the hot-mix asphalt binder course. If the hot-mix asphalt binder course is compacted more than 2 hours before placement of the hot-mix asphalt surface course, clean surface, apply primer at a uniform rate of 0.10 gal/sq yd (0.50 L/sq m), and allow the primer to cure a minimum of 1 hour before placing the hot-mix asphalt surface course.

F. Place hot-mix asphalt surface course with a minimum 1-1/2 inch (38 mm) compacted lift thickness, or greater if shown on the Project Drawings, in accordance with IDOT Standard Specifications, Section 406.

G. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Only hand compact in areas inaccessible to rolling equipment. Perform rolling with consecutive passes to achieve an even and smooth finish without roller marks.

3.05 PAVEMENT MARKING

A. Do not apply pavement marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 15 days before starting pavement marking.

C. Outdoor temperature must be 50 degrees and rising for 24 hours after installation process begins.

D. Sweep and clean surface to eliminate loose material and dust.

E. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

3.06 FIELD QUALITY CONTROL

A. Take samples and perform tests in accordance with AI MS-2.

3.07 PROTECTION OF FINISHED WORK

A. Immediately after placement, protect pavement from mechanical injury for 7 days.

B. Protect pavement markings from damage and wear during remainder of construction period.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END SECTION

321300
CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Concrete sidewalks.
      b. Concrete curbs and gutters.

B. Alternate Bid: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the General Prime Contractor.

1.03 RELATED WORK

A. Section 32 11 00 – Aggregate Base

1.04 REFERENCES

A. Illinois Department of Transportation (IDOT):
   1. Standard Specifications for Road and Bridge Construction (SSRBC), January 1, 2022 edition.

B. American Concrete Institute (ACI):
   1. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.

C. American Society for Testing and Materials (ASTM):
   1. ASTM A185 - Specifications for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
   2. ASTM A497 - Specifications for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
   3. ASTM A615/A615M - Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
   4. ASTM C33 - Specifications for Concrete Aggregates.
   5. ASTM C94 - Specifications for Ready Mix Concrete.
   6. ASTM C150 - Specifications for Portland Cement.
   7. ASTM C260 - Specifications for Air-Entraining Admixtures for Concrete.
   8. ASTM C309 - Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.
   9. ASTM C494 - Specifications for Chemical Admixtures for Concrete.
   10. ASTM D1751 - Specifications for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
   11. ASTM D1752 - Specifications for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.05 SUBMITTALS

A. Product Data: Submit name of proposed material source and material data including mix design, component certification, and component aggregate gradation. Submit data on joint filler, admixtures and curing compounds.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with IDOT Standard Specifications, Sections 420 and 421, January 2022 Edition.

B. Obtain cementitious materials from same source throughout.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 °F (4 °C), or surface is wet or frozen.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: IDOT Standard Specifications, Article 1103.05.

B. Joint Filler: IDOT Standard Specifications, Section 1051.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615 (ASTM A615M); 40 ksi (276 MPa) yield grade; deformed billet steel bars; epoxy coated finish.

B. Steel Welded Wire Fabric: Plain type, ASTM A185; Deformed type, ASTM A497; in coiled rolls, unfinished.

C. Dowels: ASTM A615 (ASTM A615M); 40 ksi (276 MPa) yield grade, plain steel, unfinished.

2.03 CONCRETE MATERIALS

A. Concrete Materials: Provide in accordance with IDOT Standard Specifications, January 2022 Edition.

B. Fine and Coarse Mix Aggregates: ASTM C33.

C. Water: Potable, not detrimental to concrete.

D. Air Entrainment: ASTM C260.

E. Chemical Admixture: ASTM C494, Type A-Water Reducing.

2.04 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1D.

2.05 CONCRETE MIX

A. Mix and deliver concrete in accordance with AC1 304 and ASTM C94

B. Provide Concrete to the following criteria
   1. Compressive Strength: 2400 psi (17 MPa) @ 7 days.
   2. Compressive Strength: 4000 psi (28 MPa) @ 28 days.
   3. Maximum Slump: 4 inch (100 mm).
   4. Minimum Water/Cement Ratio: 0.45.
   5. Air Entrained: 5 percent.
   6. Maximum Number of Bags (pounds) of cement per cubic yard of concrete: 6(564).

C. Use accelerating admixtures in cold weather only when approved by Engineer in writing. Use of admixtures will not relax cold weather placement requirements.

2.06 SOURCE QUALITY CONTROL AND TESTS

A. Submit proposed mix design of each class of concrete to the owner and/or Engineer for review prior to commencement of work.

B. Tests on cement and aggregates will be performed to ensure conformance with specified requirements.

C. Test samples in accordance with ACI 301.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing site conditions match those shown on the plans. Notify Engineer immediately if any discrepancies are found.

B. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. Prepare subbase in accordance with IDOT Standard Specifications Section 311.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

C. Notify Engineer a minimum of 24 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Interrupt reinforcement at contraction and expansion joints.

B. Place dowels to achieve pavement and curb alignment as detailed.

3.06 PLACING CONCRETE

A. Place concrete in accordance with IDOT Standard Specifications, Sections 420 and 424, January 2022 Edition.

B. Ensure reinforcement, inserts, embedded parts, waterstops, or formed joints are not disturbed during concrete placement.

C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

D. Place concrete to pattern indicated.

3.07 JOINTS

A. Place expansion and contraction joints as indicated on Contract Drawings. Align curb, gutter, and sidewalk joints.

B. Place 3/4 inch (19 mm) thick joint filler between paving components and buildings or other vertical surfaces. Recess top of filler 1/4 inch (6 mm) for sealant placement

C. Provide scored or sawn joints at 5 ft (1 m) intervals in all slab-on-grade pavement.

D. Provide keyed joints as indicated.

3.08 FINISHING

A. Area Paving: Light broom.

B. Sidewalk Paving: Light broom, radius to radius, and trowel joint edges.

C. Curbs and Gutters: Light broom.

D. Direction of Texturing: Transverse to pavement direction.

E. Inclined Vehicular Ramps: Broom perpendicular to slope.

F. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).

B. Maximum Variation from True Position: 1/4 inch (6 mm).

3.10 FIELD QUALITY CONTROL

A. Three concrete test cylinders will be taken for every 75 cu yd or less (57 cu m or less) of each class of concrete placed each day.

B. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.

C. A minimum of one slump test and one air entrainment test will be taken for each set of test cylinders taken.

D. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit vehicular traffic on concrete pavement for a minimum of 7 days after finishing.

END SECTION

SECTION 321413
PERMEABLE CONCRETE UNIT PAVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vehicular permeable concrete unit pavers for the parking lot.

B. Open-graded setting-bed aggregate directly below pavers.

C. Open-graded joint aggregate within permeable paver openings and joints.

D. Paver layout, color distribution, cutting, fitting, compaction, joint filling, cleaning, protection, and maintenance materials.

E. Permeable aggregate base, aggregate subbase, geotextile, underdrains, overflow components, and prepared subgrade are indicated on the Civil Drawings and are not specified in this Section.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Quality assurance and testing requirements.

C. Section 016000 - Product Requirements: Product options and substitution procedures.

D. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, and closeout requirements.

E. Section 312000 - Earth Moving: Excavation, prepared subgrade, and earthwork requirements.

F. Section 321313 - Concrete Paving: Concrete curb and gutter and other concrete edge restraints.

G. Civil Drawings: Permeable pavement profile, base and subbase aggregate, geotextile, underdrainage, storage volume, elevations, and drainage requirements.

1.03 REFERENCE STANDARDS

A. ASTM C29/C29M - Standard Test Method for Bulk Density and Voids in Aggregate.

B. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

E. ASTM C936/C936M - Standard Specification for Solid Concrete Interlocking Paving Units.

F. ASTM C1645 - Standard Test Method for Freeze-Thaw and Deicing Salt Durability of Solid Concrete Interlocking Paving Units.

G. ASTM C1781/C1781M - Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems.

H. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct a conference at the Project site not less than 14 days before beginning permeable unit paving. Require attendance by Contractor, paver Installer, earthwork or aggregate-base Installer, concrete curb Installer, Civil Engineer, Landscape Architect, and manufacturer representative when requested.

B. Review subgrade and aggregate reservoir acceptance, drainage components, protection from sediment, edge restraints, paver layout, custom-color production, mockup, installation equipment, sequencing, testing, protection, and joint-aggregate maintenance.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer data, installation instructions, and maintenance recommendations for permeable pavers and accessories.

C. Special-Order Color Documentation: Submit written confirmation from manufacturer identifying the following:
   1. Three proposed custom-color formulations, manufacturer color designations, and representative color range.
   2. Minimum production quantities, setup requirements, production schedule, anticipated delivery date, and confirmation that custom colors are available in the specified unit.
   3. Confirmation that Bid includes custom-color development, trial samples, setup charges, minimum-order quantities, special-order premiums, and required overage.

D. Samples:
   1. Submit not less than four full-size units of each specified color showing the anticipated range of color and texture. Samples shall be produced using the specified Smooth Premier finish.
   2. Submit two one-quart samples each of setting-bed aggregate and joint aggregate.
   3. Accepted paver and aggregate samples establish the standard for color, texture, and quality.

E. Paver Layout Drawing: Show paving limits, running-bond pattern, pattern orientation indicated on the Civil Drawings, controlled random distribution of the 3 specified colors, color percentages, control lines, transitions, edge conditions, drainage inlets, utility structures, and proposed cuts.

F. Test Reports:
   1. Pavers: Current independent laboratory reports demonstrating compliance with ASTM C936/C936M and ASTM C1645.
   2. Aggregates: Current washed sieve analyses in accordance with ASTM C136/C136M and void-content test results in accordance with ASTM C29/C29M.

G. Qualification Data: Submit Installer qualifications and a list of at least three comparable vehicular permeable-paver projects completed within the previous five years.

H. Maintenance Instructions: Submit procedures for inspection, vacuuming, sweeping, joint-aggregate replenishment, stain removal, snow removal, and replacement of damaged pavers.

I. Maintenance-Material Receipt: Submit Owner-signed receipt for extra pavers specified in this Section.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with not less than 10 years of documented experience producing permeable interlocking concrete pavers for vehicular applications.

B. Installer Qualifications: Firm specializing in installation of permeable interlocking concrete pavement with not less than five years of documented experience and successful completion of at least three projects of similar size and vehicular loading.

C. Source Limitations: Obtain each custom paver color from a single manufacturer and, where practicable, from a single production run. Obtain each aggregate type from a single source.

D. Mockup:
   1. 1. Construct a minimum 100-square-foot mockup at a location approved by the Landscape Architect.
   2. Include the complete paver assembly above the Civil aggregate base, Eco-Priora Premier pavers in the specified running-bond pattern, the 3 specified colors in the required percentages, setting-bed aggregate, joint aggregate, cuts, edge condition, curb interface, and one utility or drainage-structure interface when present.
   3. Obtain written acceptance of the Smooth Premier finish, colors, color ranges, color percentages, controlled random distribution, running-bond pattern, pattern orientation,

joint appearance, cutting, surface tolerances, and workmanship before proceeding with remaining Work.

4. Accepted mockup may remain as part of completed Work when undisturbed at completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. A. Deliver pavers in manufacturer-labeled, banded, or wrapped bundles. Identify product, color, production run, and quantity.

B. Unload and handle pavers without chipping, cracking, staining, or damaging finished surfaces or spacer bars.

C. Store pavers and aggregates on clean, stable surfaces and protect from mud, sediment, organic matter, and other contamination.

D. Keep setting-bed and joint aggregates segregated and uniformly graded. Replace contaminated materials.

1.08 FIELD CONDITIONS

A. A. Do not install pavers or setting-bed aggregate over frozen, saturated, contaminated, or unstable materials.

B. Keep permeable pavement area free of sediment throughout construction. Do not permit runoff from exposed soil or stockpiles to enter completed or partially completed pavement.

C. Do not use completed permeable paving as a construction access route or material-storage area unless accepted protection measures are in place.

1.09 1.09 MAINTENANCE MATERIALS

A. Furnish extra full-size pavers equal to 1 percent of the installed quantity of each special-order color, but not less than 20 units of each color.

B. Furnish extra joint aggregate equal to not less than 1 cubic yard or the quantity required to refill 2 percent of the completed paver area, whichever is greater.

C. Deliver maintenance materials to location designated by Owner. Package and label pavers by color and production run.

PART 2 PRODUCTS

2.01 2.01 MANUFACTURERS

A. Basis-of-Design Manufacturer: Unilock; Eco-Priora Premier permeable concrete paving units.

B. Substitutions: See Section 016000 - Product Requirements.

C. Comparable products shall match the basis-of-design unit size, thickness, joint-opening configuration, structural capacity, freeze-thaw durability, surface finish, custom-color capability, appearance, and installation requirements.

2.02 PERMEABLE CONCRETE PAVING UNITS

A. Basis-of-Design Product: Unilock Eco-Priora Premier permeable concrete paving units with integral spacer bars forming permeable aggregate-filled openings.

B. B. Application: Vehicular parking lot and associated traffic areas indicated on the Drawings.

C. Unit Size:
   1. Nominal: 5 by 10 inches.
   2. Manufacturer dimensions: 120 by 240 by 3.15 inch, approximately 4-3/4 by 9-1/2 by 3-1/8 inches.

D. D. Thickness: 3.15 inch, approximately 3-1/8 inches.

E. Finish: Smooth Premier finish utilizing manufacturer’s EnduraColor face-mix technology.

F. Edge: Manufacturer's standard chamfered edge.

G. Colors and Distribution:

1. River, custom special-order Premier finish: 55 percent.
2. Sierra, Premier finish: 30 percent.
3. Granite, Premier finish: 15 percent.

H. Pattern:
1. Install pavers in a running-bond pattern.
2. Orient the pattern as indicated on the Civil Drawings.
3. Maintain continuous, straight bond lines throughout each paving area.
4. Distribute the 3 colors randomly throughout the pattern in the specified percentages.
5. Avoid visible stripes, color bands, clusters, repetitive color sequences, concentrated color areas, or abrupt color transitions.

I. Physical Properties: Comply with ASTM C936/C936M and the following:
1. Average compressive strength: Not less than 8,000 psi, with no individual unit less than 7,200 psi when tested in accordance with ASTM C140/C140M.
2. Average water absorption: Not more than 5 percent, with no individual unit more than 7 percent when tested in accordance with ASTM C140/C140M.
3. Freeze-thaw and deicing-salt durability: Comply with ASTM C1645.
4. Dimensional tolerances: Comply with ASTM C936/C936M.

J. Provide pavers free of cracks, structural defects, objectionable chips, spalls, warping, staining, and other defects visible in the completed installation. Minor efflorescence alone is not cause for rejection.

2.03 2.03 OPEN-GRADED SETTING-BED AGGREGATE

A. Clean, washed, hard, durable, angular crushed stone complying with ASTM C33/C33M and ASTM D448, Size No. 8, unless a different compatible gradation is indicated on the Civil Drawings and accepted by the paver manufacturer.

B. Gradation:
1. 1/2-inch sieve: 100 percent passing.
2. 3/8-inch sieve: 85 to 100 percent passing.
3. No. 4 sieve: 10 to 30 percent passing.
4. No. 8 sieve: 0 to 10 percent passing.
5. No. 16 sieve: 0 to 5 percent passing.

C. Aggregate shall have zero plasticity and shall be free of fines passing the No. 200 sieve, clay, loam, organic matter, coatings, frozen material, and other deleterious substances.

D. Do not use sand, stone dust, limestone screenings, rounded gravel, or dense-graded aggregate.

2.04 OPEN-GRADED JOINT AGGREGATE

A. Clean, washed, hard, durable, angular granite chips compatible with Eco-Priora joint openings and complying with ASTM C33/C33M and ASTM D448, Size No. 9.

B. Gradation:
1. 3/8-inch sieve: 100 percent passing.
2. No. 4 sieve: 85 to 100 percent passing.
3. No. 8 sieve: 10 to 40 percent passing.
4. No. 16 sieve: 0 to 10 percent passing.
5. No. 50 sieve: 0 to 5 percent passing.

C. Color: Submit available granite-chip colors for selection by Landscape Architect. Provide one selected color throughout the Project.

D. Aggregate shall have zero plasticity and shall be free of clay, loam, organic matter, coatings, frozen material, fines passing the No. 200 sieve, and other deleterious substances.

E. Do not use sand, stone dust, limestone screenings, rounded gravel, or dense-graded aggregate.

2.05 EDGE RESTRAINTS

A. Concrete curb and gutter and other permanent edge restraints are specified in Section 321313 and indicated on the Drawings.

B. Edge restraints shall provide continuous lateral support for pavers and withstand vehicular traffic and snow-removal operations without displacement.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared subgrade, geotextile, aggregate subbase, aggregate base, underdrains, overflow components, drainage structures, elevations, slopes, compaction, and surface tolerances comply with the Civil Drawings and applicable specifications.

B. Verify concrete curb and gutter and other edge restraints are complete, true to line and grade, adequately cured, and capable of resisting paver installation and traffic loads.

C. Verify aggregate base surface is clean, stable, free-draining, and free of sediment, rutting, depressions, and contamination.

D. Notify Landscape Architect and Civil Engineer of unsatisfactory conditions. Do not proceed until corrected.

E. Beginning installation of setting-bed aggregate constitutes acceptance of underlying conditions by the paver Installer.

3.02 PREPARATION

A. Complete underground utilities, drainage components, concrete curbs, and construction that penetrates or adjoins paver areas before installing setting-bed aggregate.

B. B. Protect underdrains, observation wells, overflow pipes, inlets, and other drainage components from damage and sediment contamination.

C. Remove and replace contaminated aggregate materials. Do not wash sediment into the permeable pavement system.

D. Establish control lines to maintain the running-bond pattern, pattern orientation indicated on the Civil Drawings, controlled random color distribution, alignment, and required elevations.

3.03 SETTING-BED INSTALLATION

A. Place and screed open-graded setting-bed aggregate evenly over the completed aggregate base to the compacted thickness indicated on the Civil Drawings.

B. Maintain setting-bed aggregate in a loose, uniform condition until pavers are placed and compacted.

C. C. Do not use setting-bed aggregate to correct depressions, variations, or improper grades in the aggregate base.

D. Screed only the area that can be covered with pavers during the same working day. Protect screeded areas from traffic and disturbance.

3.04 PAVER INSTALLATION

A. Install pavers in a running-bond pattern with the orientation indicated on the Civil Drawings and accepted mockup.

B. Install the 3 colors in a controlled random distribution within the running-bond pattern using the following percentages per the colors listed in 2.02.G.
   1. Draw units vertically and concurrently from multiple bundles of each color. Distribute acceptable color variation uniformly throughout the paving.
   2. Do not create stripes, bands, clusters, repetitive sequences, or visually isolated concentrations of a single color.

C. Place units hand-tight against integral spacer bars. Maintain straight, consistent joint lines and do not force units together.

D. Use string lines or chalk lines on setting-bed aggregate to maintain pattern and alignment.

E. Adjust pattern at pavement edges to minimize cut units. Do not install cut pavers smaller than one-third of a full paver in areas exposed to vehicular tires.

F. Cut pavers with a motor-driven masonry saw to provide clean, sharp, unchipped edges. Hammer cutting is not permitted.

G. Fit pavers neatly around drainage structures, utility covers, curbs, and other penetrations. Fill openings greater than 3/8 inch with saw-cut paver pieces unless otherwise indicated.

H. Set paver surfaces approximately 1/8 inch above adjacent drainage inlets, collars, channels, and other fixed structures unless otherwise indicated.

I. Prevent construction traffic on installed pavers until initial compaction is complete and joints are filled with open-graded joint aggregate.

3.05 COMPACTION AND JOINT FILLING

A. Compact pavers into setting-bed aggregate using a low-amplitude plate compactor of type and operating frequency recommended by the paver manufacturer.

B. Use a clean urethane or approved protective mat between compactor and paver surface to prevent scuffing, chipping, or marking.

C. Make not less than three passes in perpendicular directions, or as required by manufacturer, until pavers are firmly seated and required surface tolerances are achieved.

D. Compact installed pavers to within 6 feet of the laying face before ending each day. Cover exposed setting-bed aggregate and uncompacted pavers with nonstaining protection.

E. Replace cracked, chipped, spalled, stained, or structurally damaged pavers before filling joints.

F. Spread dry open-graded joint aggregate and sweep it into joints and permeable openings immediately after initial compaction.

G. Repeat compaction, sweeping, and filling until joints and openings are completely filled and joint aggregate is approximately 1/8 inch below the paver surface, unless the manufacturer recommends a different final level.

H. Remove excess joint aggregate from paver surfaces before opening pavement to traffic.

3.06 TOLERANCES

A. Finished Surface: Do not vary more than 3/8 inch from a 10-foot straightedge placed in any direction, and maintain indicated drainage slopes.

B. Lippage Between Adjacent Pavers: Not more than 1/8 inch.

C. Pattern Alignment: Do not vary joint lines more than 1/2 inch from control lines over 50 feet.

D. Pavers shall be firm and stable, without rocking, settlement, low areas, ponding, or loose units.

3.07 FIELD QUALITY CONTROL

A. After completing joint filling and cleaning, verify finished elevations, slopes, surface tolerances, and interfaces with curbs, drainage structures, and adjacent paving.

B. When requested by the Civil Engineer or Landscape Architect, perform surface infiltration testing in accordance with ASTM C1781/C1781M. Submit test locations and results. Correct clogged or nonperforming areas and retest.

C. Replace or reset work that does not comply with specified requirements.

3.08 CLEANING AND PROTECTION

A. Remove dirt, debris, stains, and excess aggregate from exposed paver surfaces using methods recommended by the paver manufacturer.

B. Do not use acidic cleaners, wire brushes, or cleaning procedures that alter color or texture.

C. C. Protect completed pavement from sediment, staining, displacement, damage, and construction traffic. Prevent runoff from unstabilized areas from entering completed pavement.

D. Where completed pavement becomes contaminated with sediment, remove affected joint aggregate, clean or vacuum openings, replace contaminated materials, and restore permeability at no additional cost to Owner.

E. Do not apply sealer unless specifically authorized in writing by the Landscape Architect and accepted by the paver manufacturer for permeable pavement.

3.09 JOINT-AGGREGATE REFILLING

A. Inspect completed pavement between 120 and 150 days after Substantial Completion.

B. B. Remove debris from joints and permeable openings. Add clean joint aggregate matching the original material and refill to the specified level.

C. Sweep excess aggregate from the surface and submit written documentation of completed inspection and refill work.

END OF SECTION 321413

SECTION 321440
NATURAL STONE STEPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. A. Exterior natural limestone step units at the deck and pond edge.

B. Mortar setting beds, joint materials, anchorage accessories, cleaning, protection, and coordination required for a complete installation.

C. Coordination with cast-in-place concrete support, structural footing, drainage aggregate, perforated drain pipe, conduit, and step lighting.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Quality assurance requirements.

C. Section 016000 - Product Requirements: Product options and substitution procedures.

D. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, and closeout requirements.

E. Section 033000 - Cast-in-Place Concrete: Concrete step support and footing.

F. Division 26 - Electrical: Conduit, wiring, fixtures, and connections for integrated step lighting.

G. Civil Drawings: Perforated drain pipe and drainage requirements.

H. Structural Drawings: Step support, footing, and reinforcing.

1.03 REFERENCE STANDARDS

A. ASTM C568/C568M - Standard Specification for Limestone Dimension Stone.

B. ASTM C97/C97M - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.

C. ASTM C99/C99M - Standard Test Method for Modulus of Rupture of Dimension Stone.

D. ASTM C170/C170M - Standard Test Method for Compressive Strength of Dimension Stone.

E. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

F. ASTM C1242 - Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Stone source, physical properties, finishes, fabrication tolerances, setting mortar, joint materials, sealants, and cleaning products.

C. Shop Drawings: Show each stone unit, dimensions, thicknesses, joint locations, nosing profiles, setting-bed thickness, concrete bearing surfaces, drainage, and coordination with conduit and light fixtures.

D. Samples:
   1. Two stone samples, minimum 12 by 12 inches, showing the full anticipated range of color, grain, texture, and finish.
   2. Mortar and joint-material samples showing proposed color and tooling.

E. Test Reports: Current laboratory test data demonstrating compliance with ASTM C568/C568M for the proposed limestone.

F. Qualification Data: Stone fabricator and installer experience.

G. Maintenance Data: Cleaning methods, stain-removal procedures, and recommended deicing limitations.

1.05 QUALITY ASSURANCE

A. Stone Fabricator Qualifications: Firm regularly engaged in fabrication of exterior dimension stone steps with not less than five years of documented experience.

B. Installer Qualifications: Firm experienced in exterior mortar-set natural stone steps and having completed at least three similar projects within the previous five years.

C. Source Limitations: Obtain limestone for all step units from one quarry and one production run to provide a consistent range of color and texture.

D. Preinstallation Conference: Review concrete support, drainage, stone layout, lighting coordination, setting materials, joints, protection, and sequencing before installation.

1.06 MOCKUP

A. Install the first complete stone step as a mockup, including stone finish, exposed edge, mortar setting bed, joint treatment, and coordination with one step light when a light occurs at that step.

B. Obtain Landscape Architect approval before installing the remaining stone steps. Approved mockup may remain as part of the completed Work when undisturbed at completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver stone on pallets or supports that prevent cracking, chipping, staining, and contact with soil.

B. Store stone above ground under breathable, weather-resistant cover. Separate units with nonstaining spacers.

C. Handle stone with fabric slings, padded clamps, or other equipment that will not damage exposed surfaces or edges.

D. Reject units with cracks, chips, open seams, stains, warping, or other defects visible in the completed Work.

1.08 FIELD CONDITIONS

A. Do not install stone or mortar when air or substrate temperature is below 40 degrees Fahrenheit or when freezing is anticipated before mortar has cured.

B. Do not install on frozen, saturated, dirty, or unstable concrete substrates.

C. Protect newly installed stone from precipitation, rapid drying, freezing, and construction traffic.

1.09 WARRANTY

A. Warrant natural stone step installation for two years from Date of Substantial Completion against cracking, rocking, settlement, displacement, open joints, mortar failure, staining caused by installation materials, and other defects resulting from materials or workmanship.

B. Repair or replace defective Work and restore adjacent Work damaged by corrective operations at no additional cost to Owner.

PART 2 PRODUCTS

2.01 LIMESTONE STEP UNITS

A. Stone Type: Exterior-grade limestone complying with ASTM C568/C568M, suitable for horizontal walking surfaces in a freeze-thaw climate.

B. Classification: Category II, Medium Density, or denser limestone, unless approved test data demonstrate equivalent durability.

C. Color and Grain: Buff, gray, or blended natural limestone range as selected by the Landscape Architect from submitted samples.

D. Dimensions: As indicated on the Drawings. Provide one-piece units for each step width and tread segment unless otherwise approved.

E. Nominal Thickness: 6 inches, unless otherwise indicated.

F. Top Finish: Slip-resistant thermal, sandblasted, fine-dressed, or natural finish approved by the Landscape Architect. Polished finishes are not permitted.

G. Exposed Vertical Faces and Nosings: Natural split, sawn, or dressed finish matching approved samples. Remove sharp projections and ease exposed edges approximately 1/8 inch without rounding the profile.

H. Fabrication Tolerances:
   1. Thickness: Plus or minus 1/8 inch.
   2. Length and width: Plus or minus 1/8 inch.
   3. Warpage: Not more than 1/8 inch in 4 feet.

I. Provide stone free of cracks, vents, open seams, clay pockets, coatings, and defects that impair strength, durability, appearance, or installation.

2.02 SETTING AND JOINT MATERIALS

A. Setting Mortar: Factory-prepared, polymer-modified, exterior stone-setting mortar suitable for limestone, concrete substrates, freeze-thaw exposure, and the indicated 1-inch nominal setting-bed thickness.

B. Bond Coat: Polymer-modified cementitious bond coat recommended by the setting-mortar manufacturer for the concrete substrate and limestone.

C. Joint Mortar: Type S mortar complying with ASTM C270, or compatible proprietary exterior stone joint mortar, color selected by the Landscape Architect.

D. Sealant: Nonstaining, neutral-cure silicone or polyurethane sealant suitable for natural stone at movement joints and changes in plane when indicated.

E. Water: Clean and potable.

2.03 2.03 ACCESSORIES

A. Shims: High-density, nonstaining, noncompressible plastic or stainless-steel shims, used only where required for initial setting and fully embedded in mortar.

B. Cleaning Materials: Products recommended by the stone supplier and compatible with limestone, mortar, concrete, and adjacent finishes.

C. Drainage Aggregate and Perforated Drain Pipe: As indicated on the Drawings and specified in applicable civil sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concrete supports and footings are complete, properly cured, clean, dimensionally accurate, and capable of receiving the stone installation.

B. Verify finished elevations, tread and riser dimensions, drainage, adjacent deck conditions, and locations of conduit, light fixtures, boxes, and penetrations.

C. Verify that perforated drain pipe and clean gravel are installed where indicated before closing access with stone or concrete Work.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean concrete substrates of dirt, curing compounds, laitance, oil, and other materials that impair bond.

B. Mechanically roughen or prepare smooth concrete surfaces as recommended by the setting-mortar manufacturer.

C. Dry lay stone units and verify fit, alignment, tread depths, riser heights, and clearances around lighting before placing mortar.

D. Protect electrical components and conduit from mortar, water, and damage during stone installation.

3.03 INSTALLATION

A. Install stone in accordance with approved Shop Drawings, ASTM C1242, and setting-material manufacturer written instructions.

B. Apply bond coat to prepared concrete substrate and to the back of each stone unit when recommended by the mortar manufacturer.

C. Set each stone unit in a continuous 1-inch nominal mortar bed. Provide full bearing without voids. Spot setting is not permitted.

D. Set stones to the lines, grades, tread depths, and 6-inch riser increments indicated on the Drawings.

E. Pitch tread surfaces to drain without ponding. Provide a minimum slope of 1 percent unless a different slope is indicated.

F. Maintain consistent nosing alignment and joint widths. Do not use chipped edges or excessive mortar to correct dimensional discrepancies.

G. Coordinate openings, recesses, and edges with integrated step lights. Do not cover fixture faces, service access, drainage paths, or electrical boxes.

H. Remove and reset units that rock, sound hollow over substantial areas, are out of tolerance, or become stained or damaged.

3.04 JOINTING

A. Fill joints completely with joint mortar unless movement joints or open joints are indicated.

B. Tool mortar joints slightly concave or flush as approved in the mockup. Keep mortar below exposed stone arrises and remove fins or smears before hardening.

C. Install sealant at movement joints and changes in plane where indicated. Use bond breaker or backer rod to prevent three-sided adhesion.

3.05 TOLERANCES

A. Variation from indicated elevation: Plus or minus 1/8 inch.

B. Variation in adjacent tread surfaces: Not more than 1/8 inch.

C. Variation from indicated line: Not more than 1/4 inch in 10 feet.

D. Risers within a flight shall be uniform and comply with applicable accessibility and code requirements.

3.06 CLEANING AND PROTECTION

A. Remove mortar, grout, soil, and stains before materials harden. Use nonmetallic tools and cleaners approved by the stone supplier.

B. Do not use acid cleaning, wire brushes, or high-pressure washing.

C. C. Protect completed stone steps from traffic and impact until mortar has cured and through completion of adjacent Work.

D. Replace cracked, chipped, stained, loose, or otherwise unacceptable stone before Final Completion.

END OF SECTION 321440

SECTION 321540
LANDSCAPE BOULDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Natural limestone boulders for terrace seating.

B. Natural limestone boulders for retaining walls.

C. Aggregate base, excavation, placement, backfill, grading, field adjustment, cleaning, and protection required for complete installation.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Quality assurance requirements.

C. Section 016000 - Product Requirements: Product options and substitution procedures.

D. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, and closeout requirements.

E. Section 312000 - Earth Moving: Excavation, fill, subgrade preparation, and compaction.

F. Section 329119 - Landscape Grading: Finish grading adjacent to boulders.

1.03 DEFINITIONS

A. Seating Boulder: A large natural limestone boulder selected and oriented to provide a stable, generally level seating surface approximately 18 inches above adjacent finished grade.

B. Retaining-Wall Boulder: A large blocky natural limestone boulder selected and oriented to retain the adjacent slope in the single-course configuration indicated on the Drawings.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Quarry or supplier information, stone type, source, approximate density, color range, and proposed aggregate base material.

C. Boulder Selection Submittal:
   1. Numbered color photographs of each proposed seating boulder and representative retaining-wall boulders before delivery.
   2. Approximate length, width, height, and weight of each proposed seating boulder.
   3. Mark the proposed exposed face and top orientation on each photograph.

D. Layout Plan: Marked-up plan identifying proposed limits, sequence, and numbering of boulder terrace seating and retaining-wall boulders.

E. Qualification Data: Installer experience with large natural stone placement and landscape boulder retaining walls.

1.05 QUALITY ASSURANCE

A. Supplier Qualifications: Quarry or stone supplier regularly providing large landscape limestone boulders of consistent type and character.

B. Installer Qualifications: Firm having completed at least three projects involving placement of boulders of similar size, use, and complexity within the previous five years.

C. Preinstallation Conference: Review field layout, access, lifting methods, base preparation, boulder selection and orientation, utilities, adjacent Work, grading, and tolerances before placement.

D. Field Selection: Landscape Architect reserves the right to review boulders at the supplier yard or by photographs and to reject boulders that do not meet the intended appearance or functional requirements.

1.06 MOCKUPS

A. Terrace Seating: Install one representative seating boulder, complete with aggregate base and adjacent finished grades, for review before placing remaining seating boulders.

B. Retaining Wall: Install a minimum 10-foot-long representative section, or the first three boulders when the wall is shorter, showing base preparation, alignment, embedment, orientation, joints, backfill, and adjacent grading.

C. Obtain Landscape Architect approval before continuing. Approved mockups may remain as part of the completed Work when undisturbed at completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and handle boulders using fabric slings, padded clamps, or other equipment that will not chip, gouge, stain, or otherwise damage exposed stone surfaces.

B. Do not use chains directly against exposed stone surfaces.

C. Store boulders on stable ground in a manner that prevents rolling, settlement, contamination, and damage.

D. Maintain identifying numbers and orientation markings until final placement is approved.

1.08 FIELD CONDITIONS

A. Verify locations of utilities, drainage structures, lighting, irrigation, and other concealed Work before excavation or boulder placement.

B. Do not place boulders on frozen, saturated, loose, or unstable subgrade.

C. Coordinate access and lifting operations to avoid damage to completed paving, planting, pond edges, and other Work.

1.09 WARRANTY

A. Warrant boulder installations for one year from Date of Substantial Completion against settlement, rotation, instability, displacement, and failure of adjacent backfill or grading caused by improper materials or installation.

B. Reset unstable or displaced boulders and restore adjacent Work at no additional cost to Owner.

PART 2 PRODUCTS

2.01 LIMESTONE BOULDERS

A. Stone Type: Natural limestone boulders from one source, durable in exterior freeze-thaw exposure and suitable for direct ground contact.

B. Color and Texture: Consistent natural earth-tone limestone range with weathered, split, or quarry texture as approved by the Landscape Architect.

C. Quality: Sound stone free of open cracks, loose laminations, clay seams, blasting fractures, excessive weathering, or defects that impair stability, durability, or appearance.

D. Safety: Exposed surfaces shall be free of sharp projecting points, loose fragments, and unstable flakes.

E. Minimum Weight: 1,000 pounds for each seating or retaining-wall boulder unless a smaller unit is specifically approved for a transition condition.

2.02 SEATING BOULDERS

A. Form: Blocky boulders with a broad stable base and a generally flat natural top capable of functioning as seating.

B. Top Surface: Comfortable for sitting, free of sharp projections, and capable of being set approximately level with not more than 2 percent slope in any direction.

C. Exposed Height: Approximately 18 inches above adjacent finished grade, as indicated on the Drawings.

D. Size and Length: Vary units to create the natural composition indicated. Provide sufficient depth and base area to prevent rocking or overturning.

2.03 RETAINING-WALL BOULDERS

A. Form: Large blocky limestone boulders with broad bearing surfaces, stable bases, and faces capable of forming the continuous single-course retaining wall indicated.

B. Height: Select units to accommodate the variable slope height and approximately 18-inch exposed condition indicated on the Drawings.

C. Placement Configuration: Single course unless otherwise indicated. Stacked boulders are not permitted without written approval and supplemental stability requirements.

D. Provide transition boulders at wall ends and changes in grade to create a natural, stable termination.

2.04 AGGREGATE BASE

A. Dense-Graded Aggregate: Crushed stone meeting IDOT gradation CA-6 or approved equal, free of organic matter, frozen material, and deleterious substances.

B. Compacted Thickness: 12 inches, unless otherwise indicated on the Drawings.

2.05 BACKFILL

A. Suitable Backfill: Approved on-site or imported mineral soil free of organic matter, debris, frozen material, and stones that prevent proper compaction.

B. Drainage Aggregate: Clean crushed stone where indicated or required to fill localized voids without creating visible gaps at exposed faces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify boulder locations, slope heights, adjacent finished grades, utility clearances, and access for lifting equipment.

B. Verify that boulder retaining walls do not exceed the heights or configurations indicated on the Drawings.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 LAYOUT

A. Stake or mark boulder limits and centerlines. Identify each seating boulder by the number used in the approved selection submittal.

B. Review layout with the Landscape Architect before excavation and before final placement.

C. Minor field adjustments may be directed to accommodate stone shape, utilities, drainage, grades, and the intended natural composition.

3.03 SUBGRADE AND BASE PREPARATION

A. Excavate to required depth and width without disturbing subgrade beyond the limits necessary for installation.

B. Remove loose, soft, organic, frozen, or otherwise unsuitable material. Replace with compacted aggregate base.

C. Compact subgrade to a firm, unyielding condition and not less than 95 percent of maximum dry density in accordance with ASTM D698 unless another requirement is specified in Section 312000.

D. Place aggregate base in lifts not exceeding 6 inches and compact each lift to not less than 95 percent of maximum dry density in accordance with ASTM D698.

E. Shape the top of aggregate base to provide full bearing under each boulder. Point bearing on small stones or shims is not permitted.

3.04 BOULDER PLACEMENT

A. Place boulders with equipment and lifting methods that allow controlled rotation and final positioning without damage.

B. Set each boulder directly on the prepared aggregate base with full, stable bearing. Do not use wood, loose stone wedges, or visible shims.

C. Bury the base of each boulder approximately 5 inches below adjacent finished grade, unless otherwise indicated or directed to achieve stability and intended appearance.

D. Orient the approved exposed face and top as identified in the selection submittal. Provide a natural relationship among adjacent boulders.

E. Reset boulders that rock, rotate, settle, or do not meet required elevations, alignment, or appearance.

3.05 TERRACE SEATING INSTALLATION

A. A. Set seating boulders with exposed top surfaces approximately 18 inches above adjacent finished grade.

B. Orient the flattest approved surface upward. Provide not more than 2 percent slope across the seating surface and avoid low areas that retain water.

C. Maintain safe spacing and smooth grade transitions around seating boulders. Do not leave entrapment points, unstable gaps, or abrupt depressions adjacent to walking surfaces.

D. Coordinate final location and orientation with adjacent paths, planting, and sight lines.

3.06 RETAINING-WALL INSTALLATION

A. Install boulder retaining walls as a stable single course following the lines and variable heights indicated on the Drawings.

B. Set boulders tightly enough to retain backfill while preserving a natural stone composition. Avoid continuous open gaps greater than 2 inches at the retained-soil line.

C. Place larger and more stable boulders at changes in grade, wall ends, curves, and other critical locations.

D. Backfill behind boulders in lifts not exceeding 6 inches. Compact with equipment that will not move or damage boulders.

E. Grade retained slopes to drain and blend smoothly into boulder tops and ends. Verify slope height with the Landscape Architect before final grading.

3.07 TOLERANCES

A. Seating-Surface Elevation: Plus or minus 1 inch from the approved mockup and indicated finished elevation.

B. Location: Plus or minus 6 inches from indicated location after Landscape Architect field review.

C. Retaining-Wall Alignment: Natural variation is permitted, but wall shall remain within 6 inches of the approved alignment and shall not project into required path clearances.

D. Stability: No perceptible rocking, rolling, or movement under normal pedestrian use or firm manual force.

3.08 FINISH GRADING, CLEANING, AND PROTECTION

A. Complete finish grading around boulders without covering approved seating surfaces or creating depressions that hold water.

B. Remove lifting marks, soil, concrete, mortar, and other construction residue using methods that do not alter the natural stone appearance.

C. Repair erosion, settlement, and damage to adjacent paving, planting, irrigation, and other Work caused by boulder installation.

D. Protect boulders and adjacent grades from displacement and damage until Final Completion.

END OF SECTION 321540

SECTION 321543
STABILIZED DECOMPOSED GRANITE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stabilized decomposed granite paving for pedestrian paths and gathering areas.

B. Dense-graded aggregate base course below stabilized decomposed granite paving.

C. Surface preparation, installation, compaction, curing, protection, repair, maintenance, and coordination with concrete mow curb.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Testing and inspection procedures.

C. Section 016000 - Product Requirements: Product options and substitution procedures.

D. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, and closeout requirements.

E. Section 312000 - Earth Moving: Excavation, subgrade preparation, and compaction.

F. Section 321313 - Concrete Paving: Concrete mow curb

1.03 REFERENCE STANDARDS

A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's technical data, installation instructions, maintenance recommendations, and current safety data sheets for stabilized aggregate paving.

C. Aggregate Gradation: Certified sieve analysis for the proposed stabilized aggregate paving material.

D. Samples:
   1. One-quart sample of proposed stabilized aggregate paving material.
   2. One-quart sample of proposed aggregate base material.
   3. Manufacturer's full standard color range for Landscape Architect selection.

E. Qualification Data: Installer's experience and documentation of manufacturer authorization or training.

F. Maintenance Data: Recommended procedures for routine maintenance, snow removal, repair of erosion or ruts, and replenishment of surface aggregate.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Installer regularly engaged in installation of stabilized aggregate paving and having completed at least three projects of similar size and application within the previous five years.

B. Manufacturer or Supplier Authorization: Obtain stabilized aggregate paving from a manufacturer-authorized producer or dealer. Use preblended material prepared under controlled conditions.

C. Preinstallation Conference: Conduct at Project site at least one week before installation. Review subgrade and base preparation, drainage, material delivery, moisture conditioning, spreading, compaction, curing, protection, and coordination with adjacent Work.

1.06 MOCKUP

A. Construct a minimum 4 by 4 foot mockup of the complete stabilized decomposed granite paving assembly, including aggregate base course and the transition to concrete mow curb, at a location approved by the Landscape Architect.

B. Demonstrate approved color, texture, compaction, surface finish, edge conditions, and transitions to adjacent paving.

C. Obtain Landscape Architect approval before proceeding with remaining Work. Approved mockup may remain as part of the completed Work when undisturbed at completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver stabilized aggregate paving material preblended by an authorized producer or dealer and protected from contamination and segregation.

B. Store materials on clean, hard, well-drained surfaces under waterproof cover. Prevent contamination by soil, organic matter, or other aggregate.

C. Maintain blended material at the moisture content recommended by the manufacturer. Reblend material that has been stored longer than 48 hours or exposed to precipitation before installation.

1.08 FIELD CONDITIONS

A. Do not install during precipitation, on frozen or saturated subgrade, or when standing water is present.

B. Install when air and surface temperatures are 40 degrees Fahrenheit and rising and when freezing temperatures are not anticipated during the curing period.

C. Protect adjacent paving, structures, utilities, planting, and other Work from contamination or damage.

1.09 WARRANTY

A. Warrant stabilized decomposed granite paving for {CH#145433} from Date of Substantial Completion against erosion, rutting, displacement, settlement, loss of binder performance, and other defects resulting from improper materials or installation.

B. Repair or replace defective Work and restore adjacent Work damaged by corrective operations at no additional cost to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Organic-Lock Stabilized Aggregate, supplied by Kafka Granite, LLC, or approved equal.

B. Substitutions: See Section 016000 - Product Requirements.

2.02 STABILIZED DECOMPOSED GRANITE PAVING

A. Description: Factory-preblended crushed aggregate and Organic-Lock binder formulated for pedestrian traffic and exterior freeze-thaw exposure.

B. Aggregate: Sound, angular, durable crushed stone particles, free of clay lumps, organic matter, debris, and other deleterious substances.

C. Gradation: Comply with ASTM C136/C136M and the following limits:

SIEVE NO.	OPENING, MM	PERCENT PASSING
4	4.75	80 - 100
8	2.36	65 - 90

SIEVE NO.	OPENING, MM	PERCENT PASSING
16	1.18	40 - 65
30	0.60	25 - 55
50	0.30	15 - 35
100	0.15	10 - 20
200	0.075	5 - 15

D. Color: Selected by Landscape Architect from manufacturer's full standard range.

E. Material shall be supplied preblended with stabilizer at the manufacturer's recommended dosage. Field blending is not permitted unless specifically approved in writing by the manufacturer and Landscape Architect.

F. Finished Compacted Thickness: 4 inches, as indicated on the Drawings.

2.03 AGGREGATE BASE COURSE

A. Dense-graded crushed aggregate meeting Illinois Department of Transportation CA-6 gradation, or approved equivalent, free of organic matter, clay, and debris.

B. Finished Compacted Thickness: 4 inches, as indicated on the Drawings.

2.04 ACCESSORIES

A. Water: Clean and free of substances that may adversely affect the stabilized aggregate paving or adjacent Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, grades, dimensions, drainage, and locations of adjacent Work before installation.

B. Verify that subgrade and aggregate base are firm, stable, properly compacted, and free of standing water, loose material, frost, and debris.

C. Notify Landscape Architect of unsuitable conditions. Do not proceed until conditions have been corrected.

3.02 SUBGRADE PREPARATION

A. Excavate to required depth and prepare subgrade in accordance with Section 312000 and the Drawings.

B. Compact subgrade to not less than 95 percent of maximum dry density determined in accordance with ASTM D1557, unless more stringent requirements are indicated.

C. Establish required lines, grades, crowns, and cross slopes. Do not create depressions that retain water.

3.03 AGGREGATE BASE COURSE

A. Place aggregate base over prepared subgrade to a uniform compacted thickness of 4 inches.

B. Moisture-condition and compact aggregate base to not less than 95 percent of maximum dry density determined in accordance with ASTM D1557.

C. Compact and finish base to required lines, grades, and slopes. Base shall be smooth, firm, and free of ruts, loose material, and abrupt irregularities before placement of stabilized aggregate paving.

D. Vibratory compaction may be used for aggregate base when it does not damage adjacent Work.

3.04 CONCRETE MOW CURB

A. Install concrete mow curb before placing stabilized decomposed granite paving, in accordance with Section 32 13 13 and the Drawings.

B. Verify concrete mow curb is true to line and grade, fully cured, and free of defects before placing stabilized decomposed granite paving.

C. Protect concrete mow curb from staining, chipping, displacement, and other damage during installation of stabilized decomposed granite paving.

D. Place and compact stabilized decomposed granite tightly against the concrete mow curb without gaps or voids. Use compaction equipment that will not damage or displace the curb.

E. Set the finished stabilized decomposed granite surface to the elevation indicated on the Drawings.

3.05 PLACEMENT

A. Install material in accordance with manufacturer's written instructions and the approved mockup.

B. Verify material moisture content before placement. Add water only as recommended by the manufacturer to achieve uniform compaction without segregation, pumping, or surface paste.

C. Spread material uniformly without segregation. Place in two approximately equal compacted lifts to achieve a total compacted thickness of 4 inches.

D. Scarify the surface of the first lift before placing the second lift when necessary to provide a continuous bond between lifts.

E. Maintain required lines, grades, crowns, and cross slopes. Provide smooth transitions to adjacent paving and structures.

3.06 COMPACTION AND FINISHING

A. Compact stabilized aggregate paving using a single- or double-drum static roller weighing not less than 1 ton, or other equipment approved by the manufacturer for the application.

B. Do not use vibratory compaction on stabilized aggregate paving except in confined areas and only when approved by the manufacturer and Landscape Architect.

C. Compact each lift until no further visible deflection occurs and a firm, stable, uniform surface is achieved.

D. Lightly mist the surface during finishing only as required to prevent drying and surface cracking. Do not saturate the material or cause binder and fines to migrate to the surface.

E. Finished surface shall match the approved mockup and be uniform in color and texture, firm, stable, slip resistant, and free of ruts, loose areas, segregation, ridges, roller marks, and ponding.

F. Surface Tolerance: Not more than 1/4 inch variation under a 10-foot straightedge, with no abrupt vertical changes exceeding accessibility requirements.

G. Provide smooth, flush transitions to concrete mow curb and adjacent paving, within accessibility tolerances, unless otherwise indicated on the Drawings..

3.07 CURING AND PROTECTION

A. Apply a light final spray of water in accordance with manufacturer's instructions.

B. Protect completed paving from pedestrian, bicycle, construction, and maintenance traffic until fully cured, not less than 24 hours and longer when required by weather conditions or manufacturer recommendations.

C. Prevent runoff from adjacent areas from flowing across uncured paving.

D. Protect completed paving from damage by subsequent construction. Repair damaged areas before Substantial Completion.

3.08 FIELD QUALITY CONTROL

A. Landscape Architect may require verification of aggregate gradation, layer thickness, compaction, and finished surface tolerances.

B. Remove and replace Work that does not comply with specified requirements or the approved mockup.

3.09 REPAIRS

A. Repair eroded, settled, rutted, contaminated, or damaged areas by removing loose or defective material, scarifying sound adjacent material, adding matching preblended stabilized aggregate, moisture-conditioning, and recompacting.

B. Blend repairs into adjacent paving so color, texture, grade, and drainage are uniform. Repairs that remain visibly objectionable are not acceptable.

3.10 CLEANING

A. Remove excess aggregate, debris, and contamination from adjacent paving, planting, drainage structures, and other Work.

B. Do not wash aggregate, fines, or binder into planting areas, storm drains, or the pond.

3.11 CLOSEOUT ACTIVITIES

A. Provide Owner with maintenance instructions and source information for matching repair material.

B. At Final Completion, surface shall be clean, stable, properly drained, and free of erosion, ruts, depressions, and loose aggregate exceeding 1/4 inch in depth.

END OF SECTION 321543

SECTION 323216
PRECAST MODULAR BLOCK RETAINING WALL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Precast concrete modular block (PMB) retaining wall with or without geosynthetic reinforcement. Precast modular block retaining wall blocks under this section shall be cast utilizing a wet-cast concrete mix and exhibit a final handling weight in excess of 1,000 pounds (450 kg) per unit and may utilize concrete-reinforcing steel.

B. Scope of Work: The work shall consist of providing design and furnishing materials, labor, equipment and supervision for the construction of a precast modular block (PMB) retaining wall structure in accordance with the requirements of this section and in acceptable conformity with the lines, grades, design and dimensions shown in the project site plans.

1.02 RELATED REQUIREMENTS

A. IL DOT Standard Specifications for Roads and Bridges.

1.03 DEFINITIONS

A. Precast Modular Block (PMB) Unit – machine-placed, “wet cast” concrete modular block retaining wall facing unit.

B. Geotextile – a geosynthetic fabric manufactured for use as a separation and filtration medium between dissimilar soil materials.

C. Geogrid – a geosynthetic material comprised of a regular network of tensile elements manufactured in a mesh-like configuration of consistent aperture openings. When connected to the PMB facing units and placed in horizontal layers in compacted fill, the geogrid prevents lateral deformation of the retaining wall face and provides effective tensile reinforcement to the contiguous reinforced fill material.

D. Drainage Aggregate – clean, crushed stone placed within and immediately behind the precast modular block units to facilitate drainage and reduce compaction requirements immediately adjacent to and behind the precast modular block units.

E. Unit Core Fill – clean, crushed stone placed within the hollow vertical core of a precast modular block unit. Typically, the same material used for drainage aggregate as defined above.

F. Foundation Zone – soil zone immediately beneath the leveling pad and the reinforced zone.

G. Retained Zone – soil zone immediately behind the drainage aggregate and wall infill for wall sections designed as modular gravity structures. Alternatively, in the case of wall sections designed with geosynthetic soil reinforcement, the retained zone is the soil zone immediately behind the reinforced zone.

H. Reinforced Zone – structural fill zone within which successive horizontal layers of geogrid soil reinforcement have been placed to provide stability for the retaining wall face. The reinforced zone exists only for retaining wall sections that utilize geosynthetic soil reinforcement for stability.

I. Reinforced Fill – structural fill placed within the reinforced zone.

J. Leveling Pad – hard, flat surface upon which the bottom course of precast modular blocks is placed. The leveling pad may be constructed with crushed stone or cast-in-place concrete. A leveling pad is not a structural footing.

K. Wall Infill – the fill material placed and compacted between the drainage aggregate and the excavated soil face in retaining wall sections designed as modular gravity structures.

1.04 REFERENCE STANDARDS

A. Design
   1. AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
   2. Minimum Design Loads for Buildings and Other Structures – ASCE/SEI 7-10.

3. International Building Code, Current Edition.
4. FHWA-NHI-10-024 Volume I and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.
5. FHWA-NHI-10-025 Volume II and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.
6. National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls (ASD), 3rd Edition

B. Precast Modular Block Units
1. ASTM A615/A615M – Steel Bars for Concrete Reinforcement
2. ASTM A767/A767M – Galvanized Steel Bars for Concrete Reinforcement
3. ASTM A775/A775M – Epoxy-Coated Steel Reinforcing Bars
4. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete.
5. ASTM C172/C172M

C. Geosynthetics
1. AASHTO M 288 – Geotextile Specification for Highway Applications.
2. ASTM D4873 – Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

D. Soils
1. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft (2,700 kN-m/m)).

E. Drainage Pipe
1. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to start of work of this section; require attendance by affected installers.

1.06 SUBMITTALS

A. Product Data. Include technical specifications and product data from the manufacturer for the following:
1. Precast Modular Block System brochure
2. Precast Modular Block concrete test results
3. 28-day compressive strength
4. Air content
5. Slump
6. Drainage Pipe
7. Geotextile
8. Geosynthetic Soil Reinforcement (if required by the retaining wall design).

B. Installer Qualification Data.

C. Retaining Wall Design Calculations and Construction Shop Drawings.This submittal shall include the following:
1. Delegated-Design Submittal: For precast modular block retaining walls include analysis data signed and sealed by the State of IL qualified professional engineer responsible for their preparation.
2. Design Data: Submit detailed design calculations showing compliance with specified design criteria and material evaluations performed in accordance with specified design standard, signed and sealed by Design Engineer.
   a. The retaining wall layout and retaining wall heights.
   b. Proper placement, lengths and types of geogrid reinforcement where necessary.
   c. Typical wall sections.

d. Types, locations and properties of all drainage materials, appurtenances and special installation requirements not covered in this specification.
e. Retaining wall elevation views.
f. Any soils information or testing conducted in addition to that included within the project drawings and specifications.
g. Design assumptions.

3. Qualifications Statement by the retaining wall design engineer

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Contractor shall have successfully installed at least three projects similar to that of this project within the last two years. Contractor shall maintain at least one foreman on site at all times that worked on one or more of these previous installations.

B. Design Engineer Qualifications: Provide design by or under direct supervision of Professional Engineer experienced in the work of this section

C. Manufacturer Qualifications -- Concrete Units: Firm specializing in manufacturing products specified in this section and:
1. Provide certification that concrete units meet the requirements of this specification.

D. All units for the project shall be obtained from the same manufacturer. The manufacturer shall be licensed and authorized to produce the retaining wall units by the precast modular block system patent holder/licensor and shall document compliance with the published quality control standards of the proprietary precast modular block system licensor for the previous three (3) years or the total time the manufacturer has been licensed, whichever is less.

E. Preconstruction Soil Testing: Engage a qualified independent testing agency to test soil reinforcement and backfill materials for compliance with design criteria if required by design engineer.

F. Copies of Design Documents at Project Site.

1.08 DELIVERY, STORAGE AND HANDLING

A. Inspect the materials upon delivery to ensure that the proper type, grade and color of materials have been delivered.

B. Store and handle all materials in accordance with the manufacturer's recommendations as specified herein and in a manner that prevents deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, UV exposure or other causes. Damaged materials shall not be incorporated into the work.

C. Geosynthetics
1. All geosynthetic materials shall be handled in accordance with ASTM D4873/D4873M The materials should be stored off the ground and protected from precipitation, sunlight, dirt and physical damage.

D. Precast Modular Blocks
1. Precast modular blocks shall be stored in an area with positive drainage away from the blocks. Be careful to protect the block from mud and excessive chipping and breakage. Precast modular blocks shall not be stacked more than three (3) units high in the storage area.

E. Drainage Aggregate and Backfill Stockpiles
1. Drainage aggregate or backfill material shall not be piled over unstable slopes or areas of the project site with buried utilities.
2. Drainage aggregate and/or reinforced fill material shall not be staged where it may become mixed with or contaminated by poor draining fine-grained soils such as clay or silt.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Precast Modular Retaining Wall Units
   1. ReCon Wall Systems, Inc.
   2. Redi-Rock Retaining Wall Systems

2.02 PRECAST MODULAR BLOCK RETAINING WALL UNITS

A. All precast modular block units shall be sound and free of cracks or other defects that would interfere with the proper installation of the unit, impair the strength or performance of the constructed wall. Precast modular block units to be used in exposed wall construction shall not exhibit chips or cracks in the exposed face or faces of the unit that are not otherwise permitted. Chips smaller than 1.5” (38 mm) in its largest dimension and cracks not wider than 0.012” (0.3 mm) and not longer than 25% of the nominal height of the precast modular block unit shall be permitted. PMB units with bug holes in the exposed architectural face smaller than 0.75” (19 mm) in its largest dimension shall be permitted. Bug holes, water marks, and color variation on non-architectural faces are acceptable. Precast modular block units that exhibit cracks that are continuous through any solid element of the precast modular block unit shall not be incorporated in the work regardless of the width or length of the crack.

B. Without field cutting or special modification, the precast modular block units shall be capable of achieving a minimum radius of 14 ft - 6 in (4.42 m).

C. The precast modular block units shall be manufactured with an integrally cast shear knobs that establishes a standard horizontal set-back for subsequent block courses.

D. Concrete
   1. The block unit shall consist of concrete with the average 28-day compressive strength of no less than 4000 psi.
   2. Concrete shall have air entrainment by volume as measured in the plastic state in accordance with ASTM C172/C172M of:
      a. 5.5 – 8.5 percent, or
      b. In conformity with ASTM C94/C94M, latest revision.

E. Reinforcing steel, when required for the specified block, shall conform to ASTM A615/A615M and have a minimum yield strength of 60,000 psi. When required by the Owner to be galvanized or epoxy-coated, reinforcing steel shall conform to ASTM A767/A767M or ASTM A775/A775M, respectively, and have a minimum yield strength of 60,000 psi.

F. At least 1 inch of concrete cover shall be maintained over all reinforcing steel bars.

G. Each concrete block shall be cast in a single continuous pour without cold joints. With the exception of half-block units, corner units and other special application units, the precast modular block units shall conform to the manufacturer's standard nominal dimensions and be produced to the dimensional tolerances shown.
   1. Height: +/- 3/16-inch
   2. Width: +/- 1/2-inch unless field cut for fitting purposes.
   3. Depth: No less than the unit design depth (i.e. 24-inch, 39-inch, etc.) with the textured face portion of the block is considered as 4-inches

H. Face Texture: the precast modular block unit face texture shall be selected by the owner from the available range of textures available from the precast modular block manufacturer. _____.

2.03 FINISHES

A. Finished wall shall be left in natural (as-cast) color.

2.04 GEOGRID REINFORCEMENT

A. Geosynthetic reinforcement shall be high tensile geogrid or geotextile manufactured specifically for soil reinforcement applications.

B. Wall design engineer shall indicate the type, strength, location and lengths of reinforcement used.

C. The geosynthetic manufacturer shall provide all relevant testing to the wall design engineer for incorporation in the wall design.

2.05 GEOTEXTILE

A. Nonwoven geotextile fabric shall be placed as indicated on the retaining wall construction shop drawings. Additionally, the nonwoven geotextile fabric shall be placed in the v-shaped joint between adjacent block units on the same course. The nonwoven geotextile fabric shall meet the requirements Class 3 construction survivability in accordance with AASHTO M 288 AASHTO M 288.

2.06 BASE LEVELING PAD

A. Wall base leveling pad material shall consist of a compacted crushed stone base or non-reinforced concrete as indicated on the construction drawings prepared by the design engineer.

2.07 DRAINAGE AGGREGATE AND WALL INFILL

A. Draiunage aggregate and wall infill shall meet the following gradation unless an alternate material is required the design engineer.

U.S. Standard Sieve Size	 % Passing
1-½” (38 mm)	100
1” (25 mm)	95-100
½” (13 mm)	25-60
No. 4 (4.76 mm)	0-10
No. 8 (2.38 mm)	0-5

2.08 REINFORCED FILL

A. All reinforced soil, borrow or imported, shall meet all requirements of the construction drawings prepared by the design engineer. Reinforced soils, by gradation, shall have no more than 35 percent passing the number 200 sieve for walls less than 20-feet in height and no more than 15 percent passing the number 200 sieve for walls greater than 20-feet in height.

2.09 DRAINAGE PIPEIF REQUIRED IN CONSTRUCTION DRAWINGS, DRAINAGE PIPE SHALL BE PERFORATED OR SLOTTED PVC PIPE MANUFACTURED IN ACCORDANCE WITH ASTM D-3034 OR ASTM D-2412. DRAINAGE PIPE MAY ALSO BE COVERED WITH A GEOTEXTILE FILTER FABRIC.

A. Drainage pipe shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D3034 or ASTM D2412. Drainage pipe may also be covered with a geotextile filter fabric.

2.10 UNIT ADHESIVE

A. Adhesive shall be a premium, construction grade suitable for concrete and exterior applications.

PART 3 – EXECUTION

3.01 GENERAL

A. Verify locations of utilities and existing structures prior to excavation. Protection of existing underground utilities. Any new utilities proposed for installation in the vicinity of the retaining wall, shall be installed concurrent with retaining wall construction.

B. Examine the Project site and evaluate conditions where the retaining wall will be constructed. Notify the proper supervising authority in writing of any conditions that may interfere with the proper construction of the wall or delay completion.

C. Promptly notify the wall design engineer of site conditions which may affect wall performance, soil conditions observed other than those assumed, or other conditions that may require a reevaluation of the wall design.

3.02 EXCAVATION

A. Contractor shall excavate to the lines and grades shown on the construction drawings. The contractor shall be careful not to disturb the base beyond the lines indicated.

B. Foundation soils shall be excavated as required for footing base / leveling pad dimensions shown on the construction drawings, or as directed by the wall engineer.

C. Over-excavated areas shall be filled with suitable base or backfill material and compacted to 95 percent standard proctor.

3.03 PREPARATION

A. Foundation soils shall be evaluated by a Geotechnical Engineer or Owners Representative to ensure that the bearing soils meet or exceed the design conditions or assumptions.

B. Compact foundation soil zone to 95 percent standard proctor prior to installing base / leveling pad.

3.04 PRECAST MODULAR BLOCK WALL SYSTEM INSTALLATION

A. The precast modular block structure shall be constructed in accordance with the construction drawings, these specifications and the recommendations of the retaining wall system component manufacturers. Where conflicts exist between the manufacturer’s recommendations and these specifications, these specifications shall prevail.

B. Drainage components. Pipe, geotextile and drainage aggregate shall be installed as shown on the construction shop drawings.

C. First course of units shall be Base Block units and shall be placed in full contact with the base material.

D. Check units for level from side-to-side, front to back, and check to maintain unit batter front-to-back.

E. Place unit faces in contact side to side and avoid any gaps greater than 1/2-inch.

F. Fill and compact fill to grade in front of embedded units prior to compaction behind the wall units.

G. Fill voids between units with drainage rock to a distance of one foot behind the unit depth unless otherwise instructed in the construction drawings.

H. Sweep and clean the top of each course before setting additional courses.

I. Lay each successive course making sure that the bottom recess is in full contact with the unit locators of the course below. Pull unit forward as far as possible. Backfill and compact soil behind the units.

J. Check and maintain level and wall batter by use of shims when necessary.

K. Follow manufacturer recommended procedures to maintain acceptable running bond when constructing curved walls and / or corners. Build in accordance with construction drawings or manufacturer's published construction detail drawings.

L. Handle units with proper lifting devices that have been certified for the loads associated with the weights of the units. Avoid applying forces to the lifting loops in excess of the normal force associated with the weight of the unit (i.e., avoid dynamic loads from bouncing or swinging of a unit). If the unit is to be transported over a significant distance in the field, it is recommended that a CABLE be used in lieu of a chain.

3.05 GEOGRID INSTALLATION

A. Install geosynthetic reinforcement in accordance with manufacturer’s recommendations and the construction drawings.

B. Locate geosynthetic reinforcement at elevations and to the lengths shown on the construction drawings.

C. Prior to installation of geosynthetic reinforcement, level and compact backfill material to the level of the reinforcement layer.

D. Reinforcement design strength direction must be oriented perpendicular to wall face.

E. Position reinforcement on ReCon units over the tongue and groove and to within 2-inches of the front exposed face. The next course of units shall be placed such that the geogrid is deformed over the tongue and groove. The next course of units must be slid forward such that the back edge of the groove on this unit is up against the back edge of the tongue on the lower unit with the geogrid pinched between the tongue and groove. Hold in place by installing the next course of units.

F. Remove all wrinkles or folds in reinforcement by pulling taut prior to backfill placement. Secure using soil staples, stakes or hand tension until reinforcement is covered with sufficient fill to maintain tensioned position.

G. Reinforcement shall be continuous throughout the embedment length. Splicing along reinforcement strength direction is not allowed.

H. Position reinforcement sections side-by-side to provide 100 percent coverage along wall face.

I. Where curved wall sections cause overlap areas in reinforcement, maintain at least 3-inches of soil between layers where overlap occurs.

3.06 WALL INFILL AND REINFORCED BACKFILL PLACEMENT

A. Compactive effort within 3’ (0.9 m) of the back of the precast modular blocks should be accomplished with walk-behind compactors. Compaction in this zone shall be within 95% of maximum dry density as measured in accordance with ASTM D698 standard proctor or 80% relative density per ASTM D4254. Heavy equipment should not be operated within 5’ of the back of the precast modular blocks.

B. Wall fill material shall be placed in lifts no greater than 8-inches in depth and shall be less if necessary to achieve necessary compaction.

C. At the conclusion of each day’s work, slope backfill at both the crest and bottom of wall away from wall face to prevent surface drainage from scouring or ponding.

D. Protect the precast modular block wall structure against surface water runoff at all times through the use of berms, diversion ditches, silt fence, temporary drains and/or any other necessary measures to prevent soil staining of the wall face, scour of the retaining wall foundation or erosion of the reinforced backfill or wall infill.

E. For walls supporting unpaved areas, a minimum of 12” (300 mm) of compacted, low-permeability fill shall be placed over the granular wall infill zone of the precast modular block retaining wall structure. The adjacent retained soil shall be graded to prevent ponding of water behind the completed retaining wall.

3.07 OBSTRUCTIONS IN THE INFILL AND REINFORCED FILL ZONE

A. Tmake all required allowances for obstructions behind and through the wall face in accordance with the approved construction shop drawings.

B. Should unplanned obstructions become apparent for which the approved construction shop drawings do not account, the affected portion of the wall shall not be constructed until the wall design engin can appropriately address the required procedures for construction of the wall section in question.

3.08 SITE TOLERANCES

A. Straight walls
   1. Vertical Alignment: +/- 1.5-inches over any 12-feet distance and no more than +/- 3-inches over the entire length of wall.

B. Horizontal Alignment Control:
   1. Corners and radius location: +/- 1-foot to theoretical location indicated on the Grading Plan.

2. Radii: +/- 2-feet from theoretical lines indicated on the Grading Plan.

C. Wall Batter at Completion of Work: +/- 2-degrees from the design batter and no batter less than 2-degrees.

3.09 CLEANING

A. After completion of wall installation, remove construction debris and restore any adjacent finished areas affected by wall construction to their pre-construction state.

B. Wash wall face to remove soiling and stains. Do not use acid or detergents that my “burn” or discolor face.

END OF SECTION 323216

SECTION 328423
UNDERGROUND SPRINKLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Irrigation system with design delegated to the Contractor.

B. Pipe and fittings, valves, sprinkler heads, emitters, and accessories.

C. Control system.

1.02 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).

B. ASME B1.20.7 - Hose Coupling Screw Threads (Inch); 1991 (Reaffirmed 2024).

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.

E. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.

F. ASTM D2464 - Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2023.

G. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2024.

H. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).

I. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe; 2024.

J. ASTM D2672 - Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement; 2020.

K. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

L. ASTM F402 - Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings; 2026.

M. ASTM F656 - Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2025.

N. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

O. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 DEFINITIONS

A. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

B. Lateral Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with site backfilling, landscape grading and delivery of plant life.

B. Preinstallation Meeting: Convene one week prior to commencing work of this Section.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: The Contractor shall submit catalog information of all equipment for approval.

C. Qualification Data for Installer: Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Delegated Design Drawings: Comply with the performance requirements and design criteria, including analysis data.
   1. Indicate piping layout from water source, location of sleeves under pavement, location and coverage of sprinkler heads, zone valves, pipe layout and sizes, schedule of irrigation equipment and typical irrigation installation details.

E. Certificate: Certify that products of this section approved by authority having jurisdiction.

F. Operation and Maintenance Manual:
   1. Complete and submit the following information to the Landscape Architect prior to substantial completion in PDF format:
      a. Cover sheet stating Contractor's address and mobile telephone number, list of equipment with name and addresses of local supplier.
      b. Catalog and parts sheets on all material and equipment installed.
      c. Statement of Warranty: Describing an understanding of the required warranty. Provide name and phone number for responsible contact. Include manufacturer's product warranty for each component installed.
      d. Instructions for operation and maintenance of system and controls.
      e. Winterization and spring start up procedures.
      f. Schedule indicating length of time each valve is required to be open to provide a determined amount of water.
      g. Inspection forms and test results, as applicable.

G. Record Documents: The Contractor is responsible for documenting changes to the design.
   1. Record work that is installed differently than shown on the drawings. Record pipe and wiring network alterations and location changes to equipment. Keep documents current. Do not permanently cover work until as-built information is recorded.
   2. Turn over the Record Drawings to the Landscape Architect. Completion of the Record Drawings will be a prerequisite for irrigation system substantial completion and final payment.
   3. Controller Chart
      a. Provide a controller chart for each controller, clearly showing show the zones controlled.
      b. Use a different color to indicate the area of coverage for each zone.
      c. Complete and submit to the Landscape Architect prior to Substantial Completion review of the irrigation system.
      d. Upon approval the chart shall be laminated and attached to the inside of the controller enclosure, or mounted to a wall immediately adjacent to the controller.

H. Maintenance Materials: Provide the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Two (2) keys for each automatic controller.
   3. Two (2) quick coupler keys and matching hose swivels for each type of quick coupling valve installed.
   4. Two (2) sets of tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on this project.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: design irrigation system, including comprehensive analysis, by a qualified irrigation designer with not less than three years of documented experience, using performance requirements and design criteria indicated.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

C. Installer Qualifications: Contractor shall be a registered individual or firm in the state in which the work is performed. All work shall be performed under supervision of qualified personnel.
   1. Experience: An installer that has successfully installed projects of similar scope and size with minimum three years of experience.
   2. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

D. Mock-Up Installation of each irrigation detail demonstrating Contractor's understanding of the project requirements. Provide for approval a minimum of two (2) weeks prior to beginning permanent irrigation system installation.

1.07 DELIVERY, STORAGE, AND HANDLING

A. All PVC pipe shall be transported in a vehicle which allows the length of pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

C. Any section of pipe that has been dented or damaged will be discarded, or if installed, it shall be replaced with new piping.

1.08 WARRANTY

A. The purpose of this guarantee/warranty is to ensure that the Owner receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.

B. For a period of one year from date of Project Substantial Completion, the Contractor will guarantee/warranty irrigation materials, equipment, and workmanship against defects. Fill and repair depressions. Restore landscape or structural features damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by a defective item. Make repair within seven days of notification from the Owner’s Representative.
   1. Contract documents govern replacements identically as with new work. Make replacements at no additional cost to the contract price.
   2. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

C. Provide winterization and spring start up services at no additional charge during the warranty period.

PART 2 PRODUCTS

2.01 DELEGATED DESIGN REQUIREMENTS

A. Design, furnish and install a complete automatic irrigation system for turf and plant bed areas.

2.02 PERFORMANCE REQUIREMENTS

A. Location of Sprinklers and Specialties: Make minor adjustments necessary to avoid plantings and obstructions such as trees, signs and light poles. Maintain 100 percent head to head coverage of turf and planting areas. Overspray onto buildings, sidewalks and parking or driveways is not permitted.
   1. Minimum Working Pressures: Contractor shall verify the available flow and water pressure is adequate for the proposed irrigation and notify the Landscape Architect of any discrepancies. Verify if a booster pump is required.
   2. Unless noted otherwise, the construction of the sprinkler system shall include the furnishing, installing, and testing of all mains, laterals, risers and fittings, sprinkler heads, gate valves, control valves, controllers, electric wire, controls, backflow preventers,

enclosures, and other necessary specialties and the removal and/or restoration of existing improvements, excavating and backfill, and all other work in accordance with the plans and specifications a required for a complete system.

B. Do not willfully install irrigation when it is obvious in the field that unknown obstructions, grade differences, or discrepancies in area dimensions exist that might not have been considered in design. Such obstructions or differences shall immediately be brought to the attention of the Landscape Architect. In the event this notification is not performed, the Contractor assumes full responsibility for all necessary revision.

2.03 IRRIGATION SYSTEM

A. Regulatory Requirements:
   1. Comply with applicable code for piping and component requirements.

B. Products: Use only new materials of brands and types noted on Drawings and specified herein, or approved equals. No substitutions will be allowed without prior written approval from the Landscape Architect. Equipment or materials installed or furnished without prior approval will be rejected and removed at the Contractor's expense.

C. Manufacturers:
   1. Rain Bird Sales, Inc: www.rainbird.com/#sle.
   2. Hunter Industries: www.hunterindustries.com.
   3. Substitutions: See Section 016000 - Product Requirements.

2.04 PIPE MATERIALS

A. All PVC pipe used on the site shall be from the same manufacturer. All pipe and fittings shall bear the manufacturer's name or trademark, material designation, size, schedule or class, and NSF seal of approval.

B. PVC Pipe: ASTM D2241; 200 psi pressure rated;solvent weld joints for PVC pipe 3" and smaller and gasketed joints for pipe 4" and larger.

C. PVC Pipe: ASTM D1785; Schedule 40; solvent welded sockets.

D. PVC Fittings:
   1. PVC Socket Fittings: ASTM D2466, Schedule 40.
   2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
      a. All threaded connections shall be sealed using Teflon tape or paste.

E. Pipe Risers at Valves: Schedule 80 PVC nipples.

F. Solvent Cement: ASTM D2564 for PVC pipe and fittings. Include primer according to ASTM F656. Solvent to be appropriate for pipe and fitting type and weather conditions.

G. Sleeves: Sleeves for pipes passing beneath paving shall conform to ASTM D2241, Schedule 40. Minimum diameter of 2 inch or 2 sizes larger than pipe scheduled to pass through them.

H. PE Pipe with Controlled ID: ASTM D2239, PE4710 compound; SIDR 15.
   1. Sizes: 1-inch and 1-1/4-inch.
   2. Insert Fittings for PE Pipe: ASTM D2609, nylon or propylene plastic with barbed ends. Include stainless steel bands or other fasteners.

2.05 SPRINKLER HEADS

A. Rotor Sprinkler Head: Gear drive mechanism; fully adjustable for flow and pressure; size as required for application; with letter or symbol designating degree of arc and arrow indicating center of spray pattern.
   1. Description:
      a. Body Material: ABS
      b. Nozzle: ABS
      c. Retraction Spring: Stainless steel.
   2. Capacities and Characteristics:
      a. Flow varies as required to provided uniform distribution within each irrigation zone.

b. Pop-up Height: 4-inches, aboveground to nozzle.
c. Arc: Variable, adjustable dependent upon location. Adjustable, part-circle heads are not acceptable for use in 360 degree applications.
d. Inlet: bottom inlet, 3/4-inch and 1-inch.

B. Pop-Up Spray Type Sprinkler Head:
1. Description:
a. Body Material: ABS
b. Nozzle: ABS, color coded.
c. Retraction Spring: Stainless steel.
d. Pattern: Fixed, with flow adjustment.
2. Capacities and Characteristics:
a. Flow: Varies as required to provide uniform distribution within each irrigation zone.
b. Pop-up Height: 4-inches, aboveground to nozzle.
c. Pressure-Regulated to 30 PSI.
d. Arc: Full, half, quarter, or variable pattern nozzle as required to minimize overspray.
e. Radius: Varies, up to 15 feet.
f. Inlet: 1/2-inch.

C. Pop-Up Rotary Nozzle Sprinkler Head:
1. Description:
a. Body Material: ABS
b. Nozzle: ABS, color coded.
c. Retraction Spring: Stainless steel.
d. Pattern: Multi-stream, multi-trajectory.
2. Capacities and Characteristics:
a. Flow: Varies as required to provide uniform distribution within each irrigation zone. As the arc and radius are adjusted, the flow rate shall change to maintain matched precipitation.
b. Pop-up Height: 4-inches, aboveground to nozzle.
c. Pressure-Regulated to 40 PSI.
d. Arc: Infinitely adjustable arc from 45° to 105°, 90° to 210°, or 210° to 270° using the stainless steel arc ring. The full-circle sprinkler shall irrigate a full 360°.
e. Radius: Varies, up to 30 feet.
f. Inlet: 1/2-inch. Use of side inlet is not allowed in freezing climates.

2.06 SPRINKLER ACCESSORIES

A. Swing Joints for Sprinkler Heads with 3/4-inch and 1-inch inlet: Pre-fabricated PVC sprinkler riser for connections between water service and sprinkler head(s) with ACME thread and O-ring sealed rotating sections per ASTM F2768, for leak free height adjustment and impact absorption.
1. ASTM D1784 PVC Type I, Cell Classification 1254-B.
2. CWP Rating: 315 psig, ASTM D3139.
3. ASTM F1970 Rotating Section Threads: ACME with Buna O-ring seal.
4. Pressure regulating to 50 PSI.

2.07 DRIP IRRIGATION

A. Landscape Dripline:
1. Flexible, linear low-density polyethylene, ultraviolet (UV) resistance.
2. Pressure compensating emitters factory molded into tubing at set intervals to deliver water at 10-60 PSI
3. Fittings: UV-resistant, glass reinforced polypropylene barbed fittings compatible with dripline tubing.
4. Emitter spacing: as determined through delegated design to meet plant water needs.
5. Emitter flow: as determined through delegated design to meet plant water needs.

6. Line spacing: as determined through delegated design to meet plant water needs.

B. Drip Control Zone Kit: factory-assembed automatic control valve with stainless steel filter and pressure regulator.
   1. Molded-plastic body, normally closed, diaphragm type with manual flow adjustment, adjustable pressure regulation, and operated by electric solenoid.
   2. Capable of operating between 20 to 120 PSI with consistent pressure regulation to 25 or 40 PSI.
   3. 150 mesh stainless steel filter, removable cap for service and cleaning.
   4. Include PVC isolation valve immediately upstream of each drip control zone kit.

C. Flush Cap: manufacturer's standard barbed fitting with manually removable threaded cap located at the end of each run to assist with drip zone winterization.

D. Operation Indicator: 6-inch pop up indicator with 1/2-inch bottom inlet activated when system pressure exceeds 12 PSI.

E. Air Relief Valve: constructed of UV-protected and corrosion-resistant material with an operating range up to 80 PSI.

2.08 VALVES AND VALVE BOXES

A. Gate Valves: Bronze construction non-rising stem.

B. Automatic Control Valves: Molded-plastic body, normally closed, diaphragm type with manual flow adjustment, adjustable pressure regulation, and operated by elect.

C. Quick Coupler: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7; 3/4-inch hose outlet.
   1. Locking-Top Option: Vandal-resistant locking feature.
   2. Delegated design Placement and Quantity: include a minimum of two (2) quick couplers in the irrigation plan. Coordinate location(s) with Owner.

D. Water Meter: See civil drawings.

E. Backflow Preventers: See civil drawings.

F. Backflow Preventor Enclosure
   1. Top and side accessible enclosure with a fold down front panel that is easily removed to allow for unobstructed access for equipment testing and maintenance.
   2. Aluminum sheeting shall be 3003 aluminum (16 gauge), stucco embossed finish and shall meet ASTM B209/B209M.
   3. Size enclosure to allow 6-inch minimum clearance around all equipment when closed.
   4. Install and anchor to a 5-inch thick concrete pad. Size concrete pad 6-inches larger than the enclosure and controller pedestal in all directions.

G. Valve Box and Cover: with open bottom and openings for piping; designed for installing flush with grade.
   1. Size: As required for valves and service but no smaller than the following:
      a. 15"x21"x12" deep for control valves.
      b. 10" diameter for quick coupling or isolation valves.
      c. 6" diameter for drip irrigation flush valves.
   2. Shape: Rectangular for control valves, circular for specialties as indicated on details.
   3. Material: PE or ABS. Use traffic rated polymer concrete valve boxes for application when installed in concrete pavement.
   4. Drainage Backfill: Clean gravel or crushed stone, graded from 3/8 inch minimum to 3/4 inches maximum, to 6” depth below base of box. Install prior to box installation.

2.09 CONTROLS

A. Controller: Automatic controller, microprocessor solid state control with visible readout display, temporary override feature to bypass cycle for inclement weather, timer for a 4 station system, programmable for 7 days in quarter hour increments, with automatic start and shutdown.
   1. Two sensor inputs available. All controllers shall be accompanied by a rain sensor and a flow sensor.
   2. Flow monitoring capabilities.
   3. Capable of operating any two programs simultaneously.

B. Controller Housing: NEMA EN 10250 Type 3; weatherproof, watertight, with lockable access door.

C. Master Valves: Electric Solenoid; normally open; including required fittings and accessories.

D. Two-Wire Controller Cable, Decoders, Surge Protection and Wire Connectors:
   1. Cable shall be UL approved for direct burial and shall be 14-AWG or larger, as recommended by the manufacturer for the conditions of the project.
   2. Two-wire cable shall be manufactured by the controller manufacturer for specific use by that controller.
   3. Two-wire decoders and surge protection shall be manufactured by the controller manufacturer for specific use by that controller.
      a. Only single-station decoders shall be used.
   4. All connections shall be made with 3M DBR/Y-6 watertight wire connectors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of existing utilities.

B. Verify that water stub out is available, in proper location, and ready for use.

3.02 PREPARATION

A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.

B. The Contractor is responsible for layout and staking of irrigation system components.

C. Electronic design files will be available to the Contractor upon request, subject to the following conditions:
   1. A signed Electronic File Transfer Agreement shall be required from each Contractor requesting the electronic design files prior to distribution.
   2. Electronic design files will be distributed as DWG files. The Contractor will be responsible for obtaining the appropriate software to open, analyze, and/or convert these file formats for their own use, and understand the risks and limitations associated with that software.

D. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.03 EXCAVATION AND TRENCHING

A. Excavation shall be sufficient depth and width to permit proper pipe and equipment installation at the elevations intended with ample space for joining.
   1. All lines shall have a minimum clearance of 6-inches from each other and from other utilities. Parallel lines shall not be installed directly adjacent or over one another.

B. Trenches for pipellines shall provide minimum cover from finished grade as follows:
   1. Minimum Cover Over Installed Mainline Piping: 18-inches.
   2. Minimum Cover Over Installed Lateral Piping:12-inches.
   3. Minimum Cover Over Installed Sleeve Piping:18-inches.
   4. Maximum Cover Over Installed Piping: 24-inches.

C. Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots.
   1. Excavation in areas where 2” diameter and larger roots occur shall be done by hand.

2. All roots 2” and larger in diameter directly in the path of pipe or conduit, shall be tunneled under and shall be kept shaded with wet burlap or canvas.
3. Where a trenching machine is used within driplines of trees having roots smaller than 2” in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making clean cuts through.
4. Trenches adjacent to trees shall be backfilled within 24 hours.

D. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.04 INSTALLATION

A. Install pipe, valves, controls, and outlets in accordance with manufacturer's written instructions and details found on plan sheets.

B. Connect to water source.

C. Set outlets and box covers at finish grade elevations.

D. Provide for thermal movement of components in system.

E. Use threaded nipples for risers to each outlet.

F. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

3.05 PIPING

A. Install piping free of sags and bends on solid subbase, uniformly sloped without humps or depressions.

B. Cap or plug openings as pipeline is assembled to prevent entrance of dirt or obstruction. Remove caps or plugs only when necessary to continue assembly. Clean dirt and debris from inside and outside of pipe and fittings before assembly.

C. Install groups of pipes parallel to each other, spaced to permit valve servicing.

D. Install fittings for changes in direction and branch connections.

E. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.

F. Install piping in sleeves under parking lots, roadways, and sidewalks in sleeves made of Schedule PVC pipe and socket fittings, and solvent-cemented joints.

3.06 JOINT CONSTRUCTION

A. Join threaded pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to pipe threads.
2. Do not use pipe or pipe fittings with threads that are damaged.

B. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

C. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
3. PVC Nonpressure Piping: Join according to ASTM D2855.

3.07 VALVE INSTALLATION

A. Install where shown on plans and group together in straight lines where practical. Set valves boxes to align with adjacent site features (walks, curbs, etc.). Limit one valve per box.

B. Locate valves no closer than 12-inches from walk edges, building and walls. Install valve box parallel or perpendicular to walk, curb, or edge.

C. Install in planting areas where possible.

3.08 SPRINKLER INSTALLATION

A. Install sprinkler heads only after flushing of piping is complete.

B. Position all sprinkler heads low enough to prevent contact with lawn mower blades. Unless noted otherwise, set all irrigation heads perpendicular to finished grades and locate all heads two (2) to four (4) inches from curbs, walks and other boundaries.

C. Install sprinklers utilizing factory pre-fabricated swing pipe and swing joints.

D. Adjust sprinkler heads for proper distribution. In no case shall spacing exceed maximum recommended by the manufacturer and as listed on the Drawings.

3.09 DRIP IRRIGATION INSTALLATION

A. Install dripline below landscape mulch and weed barrier fabric, if applicable.

B. Install dripline with emitters facing upward or downward. Offset emitters to form a triangular pattern throughout the tubing layout.

C. Coordinate dripline installation with planting so that dripline runs over the top of all rootballs. Minimum of one emitter at each perennial/ornamental grass, minimum of two per shrub, and minimum of four per tree.

D. Connect drip tubing with barbed fittings.

E. Install drip kits with pressure reducing filter horizontally level, below grade in a valve box. The position of the filter shall be off-center to allow for removal of the filter element for periodic servicing.

F. Install air/vacuum relief valves below grade and at the highest elevation within each zone. Depending on the site conditions and tubing layout, multiple air/vacuum relief valves may be required. Place the valve within a round valve box.

G. Install flush valves horizontally level and below grade at each exhaust header. Locate in a valve box with a minimum of 1 cu. ft. of drain rock.

3.10 CONTROLLER AND ELECTRICAL CONNECTIONS

A. Install control wire/cable in same trench as irrigation piping wherever possible. Place wire/cable in trench adjacent to, or below, mainlines but not above. Install wire with slack to allow for thermal expansion and contraction. Install expansion coils at zone valves long enough so valve bonnet may be removed for maintenance. Where necessary to run wire or cable in a separate trench, provide a minimum cover of 24".
   1. Make splices only at valves, unless otherwise unavoidable. Locate all field splices on the as-built drawing.
   2. Hard wire power to controller. All connections and installations shall meet applicable electrical codes. All wire not buried to be installed in conduit.

B. Control system shall be properly grounded per manufacturer's published recommendations
   1. At a minimum, include surge protection at every 500 feet, or every 8 decoders, whichever is smaller.

3.11 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000 - Quality Requirements.

B. Tests and Inspections:

C. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   1. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. System is acceptable if no leakage or loss of pressure occurs during test period.

3.12 BACKFILLING

A. Backfill only after piping has been tested, reviewed, and accepted.

B. Excavated soil may be used as backfill. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, trash, and other extraneous matter. In rocky soil provide sand backfill material around and under the piping and risers by hand to a height of 6" above all piping. Backfill shall be compacted to 95% minimum density by mechanical tamping. Trench must be free of water during backfilling operation.

C. All backfill around valves and risers shall be mechanically compacted to 95% minimum density.

D. Backfill trench and compact to specified subgrade elevation. Protect piping from displacement.

3.13 SYSTEM STARTUP

A. Prepare and start system in accordance with manufacturer's instructions.

B. Contractor shall review controller programming and update or change program throughout establishment period. Programming must conform to local watering restrictions. Contractor is liable for fines associated with watering during restricted times.

C. Perform a coverage test to confirm water coverage and operation of the system is adequate for planting, without areas of excessive flooding, dry spots, areas of insufficient overlap, or excessive overspray. If the irrigation system is determined by the Owner to be inadequate due to poor workmanship or materials, it shall be replaced or repaired at Contractor’s expense and both pressure and coverage tests repeated until accepted.

D. Change head types for full water coverage as directed.

3.14 CLEANING

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

B. Clean surrounding areas of construction debris.

3.15 CLOSEOUT ACTIVITIES

A. Instruct Owner's personnel in operation and maintenance of system, including adjusting of controller timing. Use operation and maintenance data as basis for demonstration.

3.16 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION 328423

SECTION 329119
LANDSCAPE GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Topsoil placement.

B. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 312000 - Earth Moving

C. Section 329219 - Seeding.

D. Section 329223 - Sodding.

1.03 REFERENCE STANDARDS

A. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

1.04 FIELD CONDITIONS

A. Place topsoil during dry weather.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Topsoil excavated on-site.
   1. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
   2. Acidity Range (pH): 5.5 to 7.5.
   3. Comply with ASTM D2487 Group Symbol OH.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify grading and intended elevations are as indicated on drawings.

B. Verify absence of standing or ponding water.

3.02 PREPARATION

A. Protect site features to remain, including bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs.

B. Protect trees, plants, lawns, rock outcroppings, and other features to remain.

C. Remove debris, roots, branches, stones, in excess of 1/2 inch in size.

D. Scarify surface to depth of 3 inches.

3.03 TOPSOIL PLACEMENT

A. Uniformly distribute and spread topsoil.

B. Place topsoil in areas where seeding, sodding, and planting as indicated on drawings.

C. Place topsoil to the following compacted thicknesses:
   1. Areas Indicated Seeded with Grass: 6 inches.
   2. Areas Indicated as Sodded: 4 inches.
   3. Shrub Beds: 18 inches.
   4. Flower Beds: 12 inches.

3.04 FINISH GRADING

A. Maintain profiles and contour of subgrade.

B. Remove roots, weeds, rocks, and foreign material while spreading.

C. Maintain uniform topsoil thickness.

D. Lightly compact placed topsoil.

3.05 TOLERANCES

A. Topsoil Thickness: 1/2 inch plus/minus.

3.06 CLEANING

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

B. Remove unused topsoil. Grade stockpile area to prevent standing water.

3.07 PROTECTION

A. Protect from stormwater runoff and subsequent construction operations.

B. Do not permit traffic until established.

END OF SECTION 329119

SECTION 329219
SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Seeding, mulching and fertilizer.

B. Erosion Control.

C. Turf establishment.

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Growing Season: A growing season is considered May 1 to October 1.

C. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

D. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil or imported topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of grass seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Product tags to confirm quantity installed of the following products. Payment will not be approved until product tags have been received and approved by the Landscape Architect.
   1. Seed.
   2. Fertilizer.
   3. Fiber Mulch.

D. Qualification Data: For qualified Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact person.
   1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site
   2. Pesticide Applicator: State licensed, commercial.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and grasses during a calendar year. Submit before expiration of required initial maintenance periods.

F. Establishment Plan. Describing an understanding of the required establishment period including anticipated dates for mowing, pest control, observation and overseeding.

1.04 QUALITY ASSURANCE

A. Installer's Field Supervision: Require installer to maintain an experienced full-time supervisor on Project site when work is in progress.

B. Pre-installation Conference: Schedule a pre-installation meeting to review soil preparation and grading with the Contractor and Landscape Architect prior to seeding.

C. Seasonal limitations have been designated below. If seasonal limitations cannot be met, then an alternate soil stabilization practice must be used. Payment will be made to the Contractor for these alternate stabilization practices if caused by the conditions out of the Contractor's control and not the result of the Contractor's negligence or inability to keep the Project on schedule.
   1. Spring: April – June 15
   2. Fall: August 15 –September 15
   3. Dormant: November 1 – Freeze Up

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 PRODUCTS

2.01 SEED MIXTURE

A. Seed Mixture - No Mow Lawn:
   1. Basis of Design Manufacturer: Prairie Nursery, https://www.prairienursery.com/
      a. Type: No Mow Lawn Mix
      b. Seeding Rate: 220 lbs per acre

B. Seed Mixture - Moist Meadow - Rain Garden Seed Mix
   1. Basis of Design Manufacturer: Prairie Nursery, https://www.prairienursery.com/
   2. Type: Moist Meadow - Rain Garden Seed Mix
   3. Seeding Rate: 10 lbs per acre

C. Seed Mixture -Seed to Match Sod:
   1. To match type specified in 329223 Sodding

2.02 ACCESSORIES

A. Microbial Inoculant
   1. Inoculate seed prior to planting at rate recommended by manufacturer for seed type specified.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

D. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition
   1. Composition: 18-24-12.
   2. Application rate: 7.0 lb/1000 SF

E. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass per section 3.06 E.

F. Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

G. Erosion Fabric: excelsior fibers manufactured from aspen matting, open weave.
   1. Curlex II CL
      American Excelsior Company
      www.curlex.com
   2. Excel SS-2
      Western Excelsior Corporation
      www.westernexcelsior.com
   3. SB150
      North American Green
      www.nagreen.com

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.02 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Apply fertilizer no more than 48 hours prior to seeding.

D. Mix thoroughly into upper 2 inches of topsoil.

3.03 SEEDING

A. The specified seed mixture shall be uniformly drilled per rates listed in 2.01 using a press drill equipped with individually mounted, adjustable, spring loaded, double disk furrow openers fitted with depth control bands or drums. Hydroseeding is permitted.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Do not sow immediately following rain, when ground is too dry, or during windy periods.

D. Roll seeded area with roller not exceeding 112 lbs.

3.04 MULCHING

A. Fiber Mulch: Rate of application shall be 2,000 pounds per acre. Areas of excessive thickness of mulch, which will smother grass seedlings, shall be avoided. Mulch shall be placed on a given area as soon as possible or within 48 hours after seeding as a separate operation. The Contractor shall allow the fiber mulch to cure a minimum of 18 hours prior to watering.

3.05 EROSION CONTROL BLANKET

A. Cover seeded slopes where grade is 4:1 or greater with erosion blanket. Contractor is responsible for establishing limits.

B. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.

C. Orient erosion control blankets in vertical strips and anchored with staples, at spacing as indicated by manufacturer's written instruction for project application.

D. Provide 12 inch overlap of adjacent rolls, anchor with a common row of staples.

E. Overlap horizontal joints between erosion control blankets sufficiently to accommodate a common row of staples with the uphill end on top of the blanket below.

F. Where exposed to overland sheet flow, bury top end of each section in 6 inch (150 mm) deep excavated topsoil trench. Staple the erosion control blanket to the bottom of the trench. Backfill and compact the trench as required.

G. Secure outside edges and overlaps at 36 inch intervals with stakes.

H. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

3.06 ESTABLISHMENT

A. Provide maintenance during establishment pioriod at no extra cost to Owner; Owner will not pay for water, see item E for water requirements.

B. Begin maintenance immediately after each area is planted and continue until grass is well established and exhibits a vigorous growing condition free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 12-inches by 12-inches, **but not less than 120 days from date of Project Substantial Completion**.
   1. When maintenance period has not elapsed before the end of the growing season, or if turf is not fully established, continue maintenance during next growing season.
   2. Notify the Landscape Architect in writing upon the termination of required maintenance services. The Contractor shall continue maintenance services until written notification is provided.

C. Maintain as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Materials and installation methods shall be the same as those used in the original installation.
   1. Fill and establish turf in areas where settling occurs.
   2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
   3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards

D. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. The contractor is required to mow all seeded turf areas one time. Document and notify the Landscape Architect and Owner in writing upon completion.

E. Watering: Where an irrigation system will be installed, maintain the irrigation program to keep turf uniformly moist to a depth of 4 inches. The Contractor may obtain water from Owner's existing water system. The Village requires the contractor to obtain a meter and draw water from the purple hydrant behind the Public Works Building. Fire hydrants on site may not be used without prior Village approval.
   1. Schedule irrigation to prevent wilting, puddling, erosion, and displacement of seed or mulch.
   2. Apply water with irrigation system at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

1. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
2. Broadleaf herbicide application: Apply a broadleaf herbicide application once turf is established, or as directed by Landscape Architect, when grass is dry.

G. Protect seeded areas with warning signs during maintenance period.

3.07 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329219

SECTION 329223
SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Soil Preparation.

B. Fertilizing.

C. Sod installation.

D. Turf establishment.

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Growing Season: A growing season is considered May 1 to October 1.

C. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil or imported topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

1.03 REFERENCE STANDARDS

A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

1.04 SUBMITTALS

A. Certificate: Certify grass species and location of sod source.

B. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and grasses during a calendar year. Submit before expireation of required initial establishment period.

1.05 QUALITY ASSURANCE

A. Sod Producer: Company specializing in sod production and harvesting with minimum five years' experience, and certified by the State where the project is located.

B. Installer's Field Supervision: require Installer to maintain an experienced full-time supervisor on Projectd site when work is in progress.

C. Pre-installation Conference: Schedule a pre-installation meeting to review soil preparation and grading with the Contractor and Landscape Architect prior to seeding.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect exposed roots from dehydration.

B. Do not deliver more sod than can be laid within 24 hours.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated below; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

1. Kentucky Blue Grass Type: 100 percent (minimum 3 variety blend).

2.02 ACCESSORIES

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition
   1. Composition: 18-24-12.
   2. Application rate: 7.0 lb/1000 SF

B. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

C. Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Prepare surface soil
   1. Kill existing weed growth with non-selective herbicide a minimum of two weeks prior to planting date. Apply a second application as necessary a minimum of 24 hours prior to seeding or sodding.
      a. Apply at rate recommended by manufacturer.
   2. Loosen soil to a depth of 4-inches.
   3. Remove stones larger than 1-1/2 inches. in any dimension and sticks, roots, trash, and other extraneous matter.
      a. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to installation of sod.

C. Apply fertilizer no more than 48 hours before laying sod.

D. Mix thoroughly into upper 2 inches of topsoil.

3.04 LAYING SOD

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod immediately after delivery to site to prevent deterioration.

C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

D. Where new sod adjoins existing grass areas, align top surfaces.

E. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch below top of hard surface.

F. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

G. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

3.05 ESTABLISHMENT

A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition **but not less than 30 days from date of Project Substantial Completion.**

1. At the end of the establishment period, an inspection will be made to determine if the sod is alive and growing. If this cannot be determined, the Contractor shall have the option of maintaining the sod until it can be determined or replacing the sod. Such maintenance or replacement shall be at the expense of the Contractor. Replaced sod shall be watered as required for original sod at the expense of the Contractor. If it is determined at the end of the maintenance period the sod is well rooted, alive and growing, the Contractor shall be relieved of the responsibility for extended maintenance. Supplemental water after the 30-day establishment period is at the contractor's expense.

B. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any single mowing.

C. Neatly trim edges and hand clip where necessary.

D. Immediately remove clippings after mowing and trimming.

E. Water to prevent grass and soil from drying out. Where an irrigation system will be installed, maintain the irrigation program to keep turf uniformly moist to a depth of 4 inches. The Contractor may obtain water from Owner's existing water system. The Village requires the contractor to obtain a meter and draw water from the purple hydrant behind the Public Works Building. Fire hydrants on site may not be used without prior Village approval.

1. Schedule irrigation to prevent wilting, puddling, or erosion.
2. Adjust irrigation schedule to reduce watering as turf is established.

F. Roll surface to remove irregularities.

G. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

H. Immediately replace sod in areas that show deterioration or bare spots.

I. Protect sodded areas with warning signs during maintenance period.

END OF SECTION 329223

SECTION 329300
PLANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. New trees, plants, and ground cover.

B. Landscape Edging.

C. Mulch and Fertilizer.

D. Plant establishment.

E. Tree Pruning.

1.02 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Growing Season: A growing season is considered to be May 1 to October 1.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil or imported topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

1.03 REFERENCE STANDARDS

A. ANSI A300 Part 1 - American National Standard for Tree Care Operations -- Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2017.

B. ANSI/AHIA Z60.2 - American Standard for Nursery Stock; 2025.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Mulch
   2. Weed Barrier
   3. Steel Edging

B. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
   1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to project site.
   2. Pesticide Applicator: State licensed, commercial.

C. Maintenance Agreement: Statement of required maintenance period, duties to be performed, name and contact information of individual responsible for overseeing maintenance services.

D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

E. Statement of Warranty. Describing an understanding of the required warranty. Provide name and phone number for responsible contact.

1.05 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Pre-installation Conference: Schedule a pre-planting meeting to review preparation and planting requirements with the Landscape Architect and Contractor prior to planting. All plants, trees and shrubs shall be planted in accordance with all the drawings and specifications included in the plans.

D. Planting Restrictions: Plant during one of the following periods.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Protect and maintain plant life until planted.
   1. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
   2. Handle planting stock by root ball.
   3. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
   4. Trees may not be stored on site for more than 24 hours prior to planting without prior approval and installation of moisture retaining cover or bedding around all root balls.

1.07 WARRANTY

A. Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship or growth within the specified warranty period.

B. Failures include, but are not limited to: death and unsatisfactory growth, lack of adequate maintenance and damage from falling or blowing over. The Contractor will be responsible to remove all dead plantings and trees immediately upon notification from the Landscape Architect, even if the replacement is not immediate. This requirement applies during the warranty period as well.

C. All plants, trees and shrubs shall be **warrantied for ONE YEAR from date of Project Substantial Completion** . At the end of the warranty period the Landscape Architect shall make an inspection of the project and dead, unhealthy, or otherwise not acceptable plants, trees, and shrubs shall be replaced by the Contractor at no additional cost to the Owner.
   1. Notify the Owner and Landscape Architect in writing immediately upon completion of any warranty replacement plantings. For replacements after the initial establishment period has expired the Contractor shall water replacement plants for one week, after which the Owner assumes responsibility for watering replacement plants. If written notice is not provided the Contractor shall continue to water replacement plants until notice requirements are fulfilled.
   2. An intermediate warranty inspection may occur prior to the one year warranty expiration. Replacement is required within 60 days of the intermediate warranty inspection.
      a. If a plant replaced during the intermediate warranty period dies prior to the final warranty the contractor is not required to install a second replacement without

additional compensation. Requests for additional compensation must be approved prior to proceeding with the work.

3. Notify the Landscape Architect in writing with any concerns regarding Owner Maintenance of plant material during the warranty period.

PART 2 PRODUCTS

2.01 PLANTS

A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

B. General: All plants, trees and shrubs shall conform to or exceed minimum quality standards as defined by the American Nursery and Landscaping Association, current edition of ANSI Z60.1, and shall be purchased from a licensed Landscape Nursery. Plants, trees and shrubs furnished shall be of the same genus, species, cultivar and size as specified in the plans. Species and variety may be substituted only by the approval of the Landscape Architect. Each plant, tree and shrub shall have an identification label, removed after the Substantial Completion inspection.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

2.02 SOIL AMENDMENT MATERIALS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition.
   1. Composition: 18-24-12.
   2. Application rate: 7.0 lb/1000 SF

2.03 MULCH MATERIALS

A. Rock Mulch: Rounded riverbed gravel or smooth-faced stone.
   1. Size Range: Uniformly graded; 2 inches maximum, 1 inch minimum.
   2. Color: Readily available natural gravel color range.

B. Organic Mulch: Shredded bark mulch.
   1. Color: undyed natural wood.
   2. Particle size and consistency: a general mixture of fibers 3 inches in length or less.
   3. Remove any large mulch chunks that do not meet the requirements above.

C. Weed Barriers
   1. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric.
   2. Available Products:
      a. DeWitt Pro 5
      b. SRW Products Pro Plus V
      c. Or approved equal.

2.04 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

C. Pre-Emergent Herbicide: Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

2.05 LANDSCAPE EDGING

A. Steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
   1. Manufacturers:
      a. Border Concepts; www.borderconcepts.com
      b. Colmet; www.colmet.com
      c. The J.D. Russell Company; www.jdrussellco.com
      d. Sure-loc Edging; www.surelocedging.com
   2. Edging Size: 1/8 inch wide by 5 inches deep.
   3. Stakes: Tapered steel, a minimum of 12 inches long.
   4. Accessories: Standard tapered ends, corners, and splicers.
   5. Finish: Powder Coat.
      a. Color: Black.

2.06 ACCESSORIES

A. Treegator slow release watering bag, or approved equal; www.treegator.com
   1. Size: 20 Gallon
   2. Supply and install one per tree.

B. Metal Edging: Standard black polyethylene or vinyl edging, V-lipped bottom, extruded in standard lengths, with 9-inch steel angle stakes.
   1. Basis-of-Design: Valley View Industries Black Diamond landscape edging with manufacturer's standard alignment clips or plugs.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
   4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Prepare surface soil:
   1. Kill existing weed growth with non-selective herbicide a minimum of two weeks prior to planting date. Apply a second application as necessary a minimum of 24 hours prior to planting.
      a. Apply at rate recommended by manufacturer.
   2. Loosen surface soil to a depth of at least 6 inches.
   3. Remove stones larger than 1-1/2 inches. in any dimension and sticks, roots, trash, and other extraneous matter.

a. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after initial raking of topsoil.

C. Mix thoroughly into upper 2 inches of topsoil.

3.04 TREE AND SHRUB PLANTING

A. Place plants as indicated.

B. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.
1. Expose root flare; root flare may have been buried in the root ball during growing or tree harvesting operations.

C. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

D. Excavate planting pits with sides sloping inward at a 30-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
1. Excavate approximately five times as wide as ball diameter.
2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
3. Hand dig tree planting pits when in close proximity to existing utilities.

E. Set stock plumb and in center of planting pit or trench with **root flare 1 inch above adjacent finish grades**.
1. Use planting soil for backfill.
2. Balled and Burlapped: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Container-Grown: Carefully remove root ball from container without damaging root ball or plant.
4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

G. Set plants vertical.

H. Remove non-biodegradable root containers.

3.05 MECHANIZED TREE SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-

grown, balled-and-burlapped root-ball diameter according to ANSI/AHIA Z60.2, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Where possible, orient the tree in the same direction as in its original location.

3.06 PLANT SUPPORT

A. Trunk stabilization is not required unless deemed necessary by the Landscape Architect to maintain the tree in an upright position. Tree staking may be requested at any time between planting and expiration of the plant warranty period.
   1. Upright Staking and Tying: Use three stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
   2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.07 TREE PRUNING

A. Prune trees as recommended in ANSI A300 Part 1.

B. Newly Planted Trees: Prune as required to remove dead, damaged, broken, or split branches. Include this work in the Base Bid.

C. Existing Trees: Prune existing trees identified by the Landscape Architect in accordance with ANSI A300 and the Contract Drawings. Existing-tree pruning will be paid from the allowance specified in Section 01 21 00.

3.08 PERENNIAL AND ORNAMENTAL GRASS PLANTING

A. Set out and space perennial plants and ornamental grasses according to plan and in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly within two hours after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.09 PLANTING AREA MULCHING

A. Weed barrier fabric shall be placed at the areas specified in the plans. Weed barrier fabric shall be anchored to the ground with 6” U shaped staples. The staples shall be placed at a 4’ spacing along all edges, overlaps, and throughout the area of weed barrier fabric. The weed barrier fabric shall be overlapped 4” between rolls.

B. Mulch backfilled surfaces of planting areas and other areas indicated.
   1. Trees in Turf Areas: Apply organic mulch ring of 4-inch average thickness, with 5foot minimum diameter around trunks or stems or 12-inches outside dripline of evergreen trees. Do not place mulch within 3 inches of trunks or stems.
   2. Organic Mulch in Planting Areas: Apply 4-inch average thickness of organic mulch over whole surface of planting area. Finish level with adjacent finish grades.
      a. Do not place mulch within 3 inches of trunks or stems.

3. Rock Mulch in Planting Areas: Apply 3-inch average thickness of rock mulch over whole surface of planting area, but not less than required to fully conceal weed barrier. Finish level with adjacent finish grades.
   a. Place organic mulch ring around each individual plant or shrub.
   b. Do not place mulch within 3 inches of trunks or stems.
4. Apply pre-emergent herbicide according to manufacturer's written instruction.

3.10 ESTABLISHMENT

A. Provide maintenance during establishment period at no extra cost to Owner; Owner will pay for water.

B. Maintain plant life for 30 days from date of Project Substantial Completion.
   1. **During the establishment period the Contractor shall be on site a minimum of one hour per week throughout the maintenance period to monitor plants, water, adjust irrigation, and weed as necessary.**
   2. When maintenance period has not elapsed before the end of the growing season continue maintenance during the next growing season.
   3. Notify the Landscape Architect in writing upon termination of the required maintenance services. The Contractor shall continue maintenance services until written notification is provided.

C. Irrigate sufficiently to saturate root system and prevent soil from drying out.

D. Remove dead or broken branches and treat pruned areas or other wounds.

E. Neatly trim plants where necessary.

F. Immediately remove clippings after trimming.

G. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.

H. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

I. Remedy damage from use of herbicides and pesticides.

J. Replace mulch when deteriorated or displaced.

K. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

END OF SECTION 329300

SECTION 329335
AQUATIC PLANTS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ANSI Z-60.1 - American Nursery Stock Standard; 2014.

1.02 SECTION INCLUDES

A. Nursery-grown aquatic plants within areas identified on the Drawings as Aquatic Planting or Underwater Plants.

B. Nursery-grown wetland plants within areas identified on the Drawings as Wetland Planting.

C. Aquatic and wetland planting soil, anchorage, stabilization, and protection materials required for complete installation.

D. Layout, installation, temporary protection, establishment, maintenance, and warranty of aquatic and wetland plants.

E. Temporary waterfowl and herbivore protection required to maintain specified plant survival and coverage.

F. Seeded wetland, pond-edge erosion, riparian filter, rain-garden, upland, and turf areas are specified in Section 32 92 19.

1.03 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures and project coordination.

B. Section 014000 - Quality Requirements: Quality assurance and testing requirements.

C. Section 015000 - Temporary Facilities and Controls: Dewatering and temporary controls.

D. Section 016000 - Product Requirements: General product requirements.

E. Section 017000 - Execution and Closeout Requirements: Examination, protection, cleaning, and closeout procedures.

F. Section 329119 - Landscape Grading: Planting soil, wetland planting-area grading, and finish grading outside lined pond planting shelves.

G. Section 329219, Seeding: Seeded wetland, riparian, pond-edge, rain-garden, upland, and turf areas

H. Section 329300 - Plants: Trees, shrubs, perennials, ornamental grasses, and other non-aquatic planting.

I. Drawings: Pond grading, normal water elevation, planting areas, planting schedules, and related construction details.

1.04 DEFINITIONS

A. Aquatic Plant: A rooted plant adapted to grow in saturated soil or standing water, including emergent, marginal, and other species indicated in the Underwater Plant Schedule.

B. Aquatic Planting Area: An area identified on the Drawings as Aquatic Planting (Underwater Plants).

C. Emergent or Marginal Plant: An aquatic plant rooted in saturated soil or shallow water with stems and foliage extending above the water surface.

D. Establishment Period: The period beginning upon completion of aquatic plant installation and continuing for 90 days and until Substantial Completion, whichever is later.

E. Growing Season: May 1 through October 1.

F. Normal Water Elevation: The normal pond water-surface elevation indicated on the Drawings.

G. Aquatic Planting Soil: Clean mineral soil suitable for rooting aquatic plants and remaining stable under inundated conditions.

H. Wetland Plant: A plant adapted to saturated or seasonally inundated soil conditions and indicated in the Wetland Plant Schedule or wetland planting areas on the Drawings.

I. Wetland Planting Area: An area identified on the Drawings for installation of wetland plugs, bare-root plants, or container-grown wetland plants.

J. Wetland Plug: A nursery-propagated plant grown in an individual cell or container, with a developed root system sufficient to retain the growing medium during removal and installation.

K. Hydrologic Zone: A planting zone defined by elevation, anticipated water depth, soil saturation, frequency of inundation, and duration of inundation.

1.05 REFERENCE STANDARDS

A. ANSI Z-60.1 - American Standard for Nursery Stock; current edition.

B. Comply with applicable federal, State of Illinois, and local requirements governing noxious weeds, invasive species, aquatic herbicides, and work within regulated aquatic resources.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Aquatic and wetland plants, including botanical name, common name, specified size, production method, container or plug size, source nursery, moisture requirements, and recommended planting-water-depth or hydrologic-zone range.
   2. Aquatic and Wetland Planting Soil and soil amendments, if proposed.
   3. Anchorage, stabilization, and temporary waterfowl or herbivore protection materials.

C. Procurement and Source List: Within 21 days after Notice of Award, submit proposed sources, quantities, sizes, availability, and anticipated delivery dates for each aquatic and wetland plant species.

D. Aquatic and Wetland Planting Layout: Submit a plan showing proposed distribution of each species, planting densities, spacing, hydrologic zones, access routes, and temporary protection limits.

E. Aquatic and Wetland Planting Work Plan: Describe sequencing, access, water-level management, soil preparation, planting methods, pond-liner protection, erosion-control coordination, stabilization, temporary waterfowl and herbivore protection, maintenance, and replacement procedures.

F. Qualification Data: Submit qualifications for aquatic planting Installer and on-site supervisor, including at least three comparable completed projects and references.

G. Samples: Submit one-gallon sample of proposed aquatic planting soil when imported soil is required.

H. Maintenance Records: Submit dated records of inspections, water-level observations, maintenance activities, replacements, and corrective work at intervals not exceeding 30 days.

I. Warranty Statement: Submit written acknowledgment of warranty requirements and contact information for the party responsible for warranty service.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: A firm specializing in aquatic and wetland planting with at least five years of documented experience and successful completion of at least three projects of similar size and character.

B. Installer's Field Supervision: Maintain an experienced supervisor on site whenever aquatic planting Work is in progress.

C. Source Nursery: A nursery regularly engaged in propagation and production of native aquatic and wetland plants. Plant material shall be nursery-propagated and shall not be collected from wild populations unless specifically approved in writing.

D. Preinstallation Conference: Review pond and wetland grading, hydrologic zones, water elevations, soil conditions, access, planting layouts, liner protection, erosion-control materials, sequencing, temporary protection, establishment, and maintenance.

E. Layout Review: Stake or flag representative plant groupings and obtain Landscape Architect approval before proceeding with full installation. Provide at least 48 hours notice for review.

F. Invasive Species Control: Deliver plants, soil, containers, and equipment free of prohibited invasive plants, seeds, rhizomes, pathogens, and aquatic nuisance organisms.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Label each plant or group of plants with durable identification showing botanical name, common name, quantity, and source.

B. Protect plants from drying, overheating, freezing, wind, contamination, and mechanical damage during transportation and storage.

C. Maintain roots and planting media continuously moist. Maintain submerged plants under conditions recommended by the nursery. Do not allow roots or crowns to dry.

D. Deliver plants after planting areas are prepared and install promptly. Do not store aquatic plants on site for more than 24 hours without written approval and an approved method for maintaining plant health.

E. Reject and replace plants that are wilted, desiccated, overheated, frozen, diseased, infested, damaged, or otherwise unsuitable for planting.

F. Maintain wetland plugs and container-grown wetland plants continuously moist but not submerged unless recommended by the nursery.

1.09 FIELD CONDITIONS

A. Plant during the active growing season, generally May 15 through September 15, and not less than six weeks before the anticipated first hard freeze, unless otherwise approved by the Landscape Architect.

B. Do not plant in frozen soil, during severe weather, when soil is excessively dry or unworkably saturated, or when water levels, flows, or soil conditions prevent proper installation.

C. Coordinate aquatic and wetland planting with final pond and wetland grading, erosion and sediment controls, pond-liner installation, shoreline stabilization, dewatering, erosion-control blankets, and establishment of design water elevations.

D. Do not puncture, displace, or otherwise damage pond liner, geotextiles, underdrains, utilities, or other concealed construction.

1.10 WARRANTY

A. Warranty Period: One year from Date of Substantial Completion.

B. Warrant aquatic and wetland plants against death, failure to establish, dislodgement, unacceptable growth, and loss of specified density or distribution resulting from defective plant material, improper installation, inadequate protection, or inadequate maintenance.

C. Acceptance Criteria at Warranty Inspection:
   1. Woody aquatic and wetland plants: 100 percent alive, healthy, and securely rooted.
   2. Herbaceous aquatic and wetland plants: Minimum 90 percent survival by species and planting area, with plants uniformly distributed and no contiguous unplanted area greater than 25 square feet unless otherwise indicated.
   3. Planting areas free of prohibited invasive plants and objectionable weeds.
   4. No significant erosion, scour, sediment burial, floating plants, or displacement.

D. Replace unacceptable plants and restore planting density at no additional cost. Complete replacement during the next suitable planting period and within 30 days after notice when seasonal conditions permit.

E. Warrant replacement plants through the remainder of the original warranty period, but not less than 90 days after replacement.

F. When the warranty inspection would occur outside the active growing season, the Landscape Architect may defer evaluation until plants have resumed active growth.

PART 2 PRODUCTS

2.01 AQUATIC PLANTS

A. Species, quantities, sizes, and locations: As indicated in the Aquatic or Underwater Plant Schedule and on the Drawings. Quantities shown in schedules are for convenience; quantities and planting extents indicated on the plans govern.

B. Provide plants true to botanical name and cultivar, sound, healthy, vigorous, and free from disease, insects, invasive species, injuries, and defects that impair growth.

C. Provide nursery-propagated stock grown under aquatic or saturated-soil conditions appropriate for the species. Terrestrial nursery stock recently acclimated to aquatic conditions is not acceptable.

D. Provide plant material grown in climatic conditions similar to the Project locality. Use regional native genotype from the Upper Midwest when commercially available.

E. Provide well-developed, fibrous root systems that hold planting media together when removed from containers. Plants shall not be root-bound, pot-bound, or recently divided to meet specified size.

F. Container-Grown Plants: Provide container sizes indicated. Root mass shall fill the container without circling, girdling, or matted roots. Containers shall be free of aquatic nuisance organisms and prohibited weeds.

G. Substitutions: Comply with Section 016000. Substitute species only after documented exhaustion of specified sources and written approval by the Landscape Architect.

2.02 WETLAND PLANTS

A. Species, quantities, sizes, spacing, and locations shall be as indicated in the Wetland Plant Schedule and on the Drawings.

B. Provide wetland plants true to botanical name and cultivar, sound, healthy, vigorous, and free from disease, insects, invasive species, injuries, and defects that impair growth.

C. Provide nursery-propagated stock grown under saturated-soil or wetland conditions appropriate for the species. Plants recently transplanted from conventional terrestrial nursery production to meet specified requirements are not acceptable.

D. Provide plant material grown in climatic conditions similar to the Project locality. Use regional native genotype from the Upper Midwest when commercially available.

E. Wetland Plugs: Provide the plug or container size indicated in the plant schedule, with well-developed roots that hold the growing medium together when removed from the container.

F. Bare-Root Plants, if indicated: Provide dormant or actively growing material as appropriate for the species and season, with healthy roots and crowns protected from drying.

G. Plants shall not be root-bound, pot-bound, desiccated, recently divided, or collected from wild populations.

H. Substitutions: Comply with Section 01 60 00. Substitute species only after documented exhaustion of specified sources and written approval by the Landscape Architect.

2.03 AQUATIC AND WETLAND PLANTING SOIL

A. Existing Soil: Existing pond-bottom or planting-shelf soil may be used when approved and when it is clean, stable under inundation, and suitable for rooting the indicated species.

B. Imported Aquatic Planting Soil: Clean mineral loam or clay loam capable of retaining plant roots and remaining stable when inundated.

1. Organic Matter: Not more than 10 percent by dry weight.
2. pH: 5.5 to 8.0.
3. Free of refuse, contaminants, concrete washout, construction debris, roots, sod, noxious weeds, invasive plant propagules, and stones larger than 1 inch.
4. Do not use peat, manure, biosolids, uncomposted organic material, or highly organic topsoil.

C. Fertilizer: Do not incorporate fertilizer into aquatic planting soil and do not use fertilizer tablets or other fertilizer products unless specifically approved in writing by the Landscape Architect.

D. Wetland planting soil shall be capable of supporting the specified plants under the anticipated hydrologic conditions without excessive settlement, erosion, or displacement

2.04 ANCHORAGE AND PROTECTION MATERIALS

A. Gravel Ballast: Clean, washed, inert rounded gravel, 3/8 to 1 inch in size, free of fines, contaminants, and sharp particles that could damage pond liner.

B. Anchorage: Biodegradable coir, untreated wood stakes, or other noncorrosive and noninjurious anchorage approved by the Landscape Architect. Do not leave exposed wire, plastic ties, or sharp components.

C. Temporary Waterfowl and Herbivore Protection: Materials and system proposed by Installer and approved by Owner and Landscape Architect. Provide a durable, visible system that does not create a public hazard, entangle wildlife, damage plants, or interfere with pond operations.

D. Planting Markers: Weather-resistant stakes or flags suitable for temporary identification of species and planting groups. Remove before Final Completion unless otherwise directed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that pond grading, wetland grading, planting shelves, hydrologic zones, water elevations, aquatic and wetland planting limits, and substrate conditions comply with the Contract Documents.

B. Verify that pond liner and related protective layers are complete and that sufficient planting soil is present above the liner to receive root systems without contact with or penetration of the liner.

C. Verify that erosion and sediment controls are functioning and that planting areas are free of standing construction sediment, debris, oil, chemicals, and other contaminants.

D. Notify Landscape Architect of unsuitable conditions, discrepancies, or insufficient planting-soil depth. Do not proceed until conditions have been corrected or written direction has been received.

E. Verify wetland planting areas are at the elevations required to provide the anticipated duration and depth of saturation or inundation.

3.02 PREPARATION

A. Coordinate temporary lowering, exclusion, or control of water as required to provide safe access and proper planting conditions. Do not operate permanent water-control devices without Owner authorization.

B. Remove trash, debris, construction sediment, and existing undesirable vegetation from aquatic and wetland planting areas. Dispose of removed material legally.

C. Remove prohibited invasive plants, roots, rhizomes, and fragments. Do not use aquatic herbicides without written approval and required permits.

D. Prepare aquatic planting soil to a firm, friable condition suitable for excavation of planting holes. Do not overwork saturated soil or create suspended sediment.

E. Restore eroded or disturbed planting shelves to required lines and grades before planting.

F. Coordinate wetland planting with erosion-control blankets. Cut or open blankets only as required to install plants. Do not remove or significantly weaken blankets.

3.03 PLANT LAYOUT

A. Lay out aquatic and wetland plants in naturalistic drifts and groupings within the planting areas indicated on the Drawings. Use triangular spacing unless otherwise indicated.

B. Distribute species according to the water-depth, soil-moisture, saturation, and inundation requirements of each species and the final grades and normal water elevation indicated on the Drawings.

C. Adjust plant locations within indicated planting areas as directed by the Landscape Architect to respond to field conditions. Do not reduce quantities or planting densities.

D. Obtain approval of layout before beginning installation. Layout approval does not constitute acceptance of plant quality or completed Work.

3.04 AQUATIC PLANT INSTALLATION

A. Use hand methods, low-ground-pressure equipment, amphibious equipment, or access mats as required to avoid rutting, compaction, erosion, and damage to pond liner, planting shelves, shoreline, and adjacent Work.

B. Plant immediately after removing plants from protected storage. Keep unplanted stock continuously moist and shaded.

C. Remove nonbiodegradable containers and identification tags from root balls. Carefully loosen circling roots without breaking the root mass apart. Do not remove approved biodegradable containers unless directed.

D. Excavate planting holes at least twice the width of the root mass and only deep enough to place the plant crown at the same elevation at which it grew in the nursery, unless a different depth is indicated for the species.

E. Place plants plumb and orient natural growth habit upright. Backfill with aquatic planting soil, work soil firmly around roots, and eliminate voids without excessive compaction.

F. Anchor plants as required to prevent floating, scour, washout, or displacement. Use gravel ballast only where it will not bury the crown or interfere with new growth.

G. Maintain required spacing and planting density. Replace plants damaged during installation.

H. Remove excavated excess soil from the pond and dispose of it in accordance with the Contract Documents. Do not spread excess soil over completed aquatic planting areas.

3.05 WETLAND PLANT INSTALLATION

A. Install wetland plants at the locations, spacing, and hydrologic zones indicated on the Drawings.

B. Keep plants continuously moist and protected until installed.

C. Remove nonbiodegradable containers and identification tags without damaging roots or crowns.

D. Excavate planting holes sufficiently large to receive root systems without bending, circling, or crowding roots.

E. Set plugs and container-grown plants with the top of the root mass level with adjacent finished soil unless otherwise indicated for the species. Do not bury plant crowns.

F. Firm planting soil around roots to eliminate voids and securely anchor plants without excessive compaction.

G. Where planting through erosion-control blanket, cut a minimum-size opening, install the plant, close the blanket tightly around the stem, and secure disturbed blanket edges with biodegradable staples.

H. Water plants immediately after installation when the planting soil is not saturated. Continue watering as required until design hydrology is established.

I. Replace plants damaged, uprooted, buried, or displaced during installation.

3.06 WATER-LEVEL MANAGEMENT

A. Coordinate water-level management with Owner and the work of pond grading, dewatering, stormwater, fountain, and aeration systems.

B. Maintain water depth appropriate for installation and establishment of the specified species. Avoid rapid inundation, drawdown, wave action, or current that may dislodge plants before rooting.

C. When practicable, raise water level gradually after planting in accordance with the approved Aquatic Planting Work Plan.

D. Coordinate initial operation of pond fountain and aeration equipment so that currents and wave action do not dislodge new plantings.

3.07 TEMPORARY PROTECTION

A. Protect aquatic planting areas from construction traffic, public access, waterfowl, herbivores, scour, sediment deposition, and damage until plants are established and accepted.

B. Install temporary waterfowl and herbivore protection immediately after planting when included in the approved Work Plan or directed by the Landscape Architect.

C. Inspect protection at each maintenance visit. Repair, reposition, or replace damaged protection promptly.

D. Remove temporary protection when authorized by the Landscape Architect. Restore disturbed areas and remove all stakes, ties, netting, and debris.

3.08 ESTABLISHMENT AND MAINTENANCE

A. Maintain aquatic plants throughout the Establishment Period at no additional cost to Owner.

B. Inspect planting areas at least twice each week during the first 30 days and at least weekly thereafter. Increase inspection frequency following storms, major water-level changes, or operation of pond equipment.

C. Maintenance includes:
   1. Resetting, reanchoring, or replacing floating, dislodged, buried, eroded, damaged, dead, or declining plants.
   2. Maintaining appropriate water depth and coordinating required water-level adjustments with Owner.
   3. Removing trash, debris, sediment deposits, algae accumulations that smother plants, and prohibited invasive or objectionable vegetation.
   4. Repairing erosion, scour, disturbed planting soil, and temporary protection.
   5. Maintaining species distribution and planting density indicated on the Drawings.
   6. Watering wetland plants when rainfall, pond elevation, or site hydrology is insufficient to prevent plant stress.
   7. Hand removal of invasive and objectionable plants before seed set.
   8. Replacing wetland plants that are dead, missing, uprooted, buried, or located outside their required hydrologic zones.
   9. Repairing erosion-control blankets and disturbed wetland soil.

D. Do not use pesticides, aquatic herbicides, algaecides, or fertilizers without written approval by Owner and Landscape Architect and compliance with applicable permit requirements.

E. Replace unacceptable plants during the Establishment Period as often as required to satisfy acceptance criteria.

F. Maintain dated maintenance records and submit them as specified.

3.09 ACCEPTANCE

A. Initial Inspection: Notify Landscape Architect when installation is complete. Planting areas shall be correctly laid out, fully planted, clean, stabilized, and protected before inspection.

B. Substantial Completion: Aquatic planting Work will be considered substantially complete when plants are alive, healthy, securely installed, and distributed as indicated; required protection and maintenance are in place; and incomplete or defective Work does not prevent establishment.

C. End-of-Establishment Acceptance Criteria:
   1. Woody aquatic plants: 100 percent alive and healthy.
   2. Herbaceous aquatic plants: Minimum 90 percent survival by species and planting area.
   3. No significant erosion, scour, sediment burial, floating plants, or prohibited invasive plants.
   4. Temporary protection functional and maintained until removal is authorized.

D. Correct deficiencies identified in Observation Reports, punch lists, or inspection reports within 14 days or within the next suitable planting period when seasonal conditions prevent immediate correction.

3.10 WARRANTY INSPECTION AND REPLACEMENT

A. Request warranty inspection not less than 30 days before expiration of warranty. Schedule inspection during active growth when plant condition can be evaluated.

B. Replace dead, missing, unhealthy, dislodged, or unacceptable plants and restore required species distribution and density.

C. Provide the same temporary protection and maintenance for replacement plants as required for original planting.

D. Complete corrective work and submit written notice before requesting final acceptance.

3.11 CLEANING

A. Remove unused plants, containers, labels, stakes, excess soil, packaging, and debris from Project site.

B. Restore access routes, staging areas, pond edges, and adjacent Work damaged or disturbed by aquatic planting operations.

END OF SECTION 329335

334200
STORM SEWER SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Site storm sewerage drainage piping, fittings and accessories, and bedding and backfill.
      b. Catch basins, area drains, paved area drainage and site surface drainage.
      c. Castings such as frames and grates or covers.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 SCOPE

A. The following specification contains scope to be performed by the Plumbing Prime Contractor.

1.03 RELATED WORK

A. Section 31 20 00 – Earth Moving

B. Section 31 30 00 - Soil Erosion and Sedimentation Control

C. Section 31 40 00 - Trenching

D. Section 31 41 00 – Acceptance of Backfill

1.04 REFERENCES

A. Standard Specifications for Water and Sewer Main Construction in Illinois (SSWSMCI),8th edition, 2020.

B. ASTM C14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

C. ASTM C76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

D. ASTM C425 - Specification for Compression Joints for Vitrified Clay Pipe and Fittings.

E. ASTM C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

F. ASTM C564 - Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

G. ASTM C700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.

H. ASTM D2321 - Practice for Underground Installation of Flexible Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

I. ASTM D2729 - Specification Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

J. ASTM D3034 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

K. ASTM A746 - Specification for Ductile Iron Gravity Sewer Pipe.

L. ANSI A21.11 – Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

1.05 SUBMITTALS

A. Product Data: Provide data indicating type of pipe and pipe accessories.

B. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.06 CLOSEOUT SUBMITTALS

A. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations for incorporation into the project record drawings.

B. Identify and describe unexpected variations to subsoil conditions or discovery of undocumented utilities.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable municipal codes and SSWSMCI requirements for materials and installation of the Work of this Section.

B. Village of Streamwood Code: Conform to applicable Village of Streamwood code for materials and installation of the work in this section.

C. Village of Streamwood Department of Sewers: Obtain required permits from Village of Streamwood Department of Sewers.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements and elevations are as indicated.

1.09 COORDINATION

A. Coordinate the Work with termination of storm sewer connection(s) outside building, trenching, and connection to municipal or existing sewer utility service.

B. Coordinate work between multiple prime contractors.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Accept products on site. Inspect for accuracy of products and for damage.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. Extra-Strength Vitrified Clay Pipe:
1. Pipe: ASTM C700, Extra-Strength type, bell and spigot end.
2. Joint Device: ASTM C425, rubber gasket joint devices.
3. Installation: ASTM C12.

B. Polyvinyl Chloride (PVC) Pipe:
1. Pipe: Must conform to Section 1040.03 of IDOT Standard specifications for Road and Bridge construction, Latest edition
2. Minimum wall thickness: SDR 26

C. Reinforced Concrete:
1. Pipe: ASTM C76, Class III Wall B.
2. Joint Device: ASTM C443, rubber gasket joint devices.

D. Cast Iron:
1. Pipe: ASTM A74, bell and spigot end.
2. Joint Device: ASTM C564, rubber gasket joint devices.

E. Pipe Underdrains
1. All pipe underdrains and fittings shall be of the sizes, lengths and quantities shown and the quality specified.
2. Pipe underdrain shall be a perforated PVC pipe with a smooth interior and shall meet the material requirements of ASTM D 3034 (AASHTO M 278).
3. Pipe underdrains shall be placed in a fabric lined trench with angular granular material gradation CA 7 around PVC pipe underdrain (see drawings). The fabric shall be overlapped at the top of the trench. The overlap shall match the trench width. At other seams the fabric shall be overlapped a minimum of 12 inches

F. Ductile Iron Pipe:
1. Pipe: ASTM A746, Extra Heavy type Class 52 wall thickness, bell and spigot end.
2. Joint Device: ANSI A21.11, rubber gasket joint devices, or mechanical joints.

2.02 GEOTEXTILE

A. Manufacturers: Subject to compliance with requirements, provide materials from one of the following:
   1. TenCate Mirafi.
   2. Thrace-Linq.
   3. Kintex Geotextile Fabrics
   4. ERO-TEX

B. Subsurface Geotextile: Woven monofilament geotextile, manufactured for subsurface drainage applications, made from polyolefins or polypropylene; with elongation less than 50 percent; and the following minimum average roll values measured:
   1. Grab Tensile Strength: 365 lbf; ASTM D 4632.
   2. Trapezoidal Tear Strength: 115 lbf; ASTM D 4533.
   3. Puncture Strength: 100 lbf; ASTM D 4833.
   4. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
   5. Permittivity: 2.14 per second, minimum; ASTM D 4491.
   6. Flow Rate: 145 gallons/min/sq.ft
   7. POA (Percent Open Area): 10%

C. Subsurface Geotextile: Non-woven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
   1. Grab Tensile Strength: 157 lbf; ASTM D 4632.
   2. Sewn Seam Strength: 142 lbf; ASTM D 4632.
   3. Tear Strength: 56 lbf; ASTM D 4533.
   4. CBR Puncture Strength: 320 lbf; ASTM D 6241.
   5. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
   6. Permittivity: 0.2 per second, minimum; ASTM D 4491.

2.03 ACCESSORIES

A. Pipe Joints: Mechanical clamp ring type, ribbed gasket for positive seal.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tees, bends, elbows, cleanouts, reducers, traps, and other configurations required.

2.04 CATCH BASINS

A. Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints.
   1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
   2. Riser Sections: 4-inch minimum thickness; 48-inch diameter, and lengths to provide depth indicated.
   3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
   4. Gaskets: ASTM C 443 (ASTM C 443M), rubber.
   5. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match a 24-inch- diameter frame and grate.
   6. Steps: ASTM C 478 (ASTM C 478M) individual steps or ladder. Omit steps for catch basins less than 60 inches deep.
   7. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

B. Frames and Grates: ASTM A-48, cast gray iron per Village of Streamwood – Department of Water Management – Include indented top design with lettering cast into cover:
   1. Storm Drainage Piping Systems: Raised flush letters per DWM.

2.05 BEDDING AND COVER MATERIALS:

A. Bedding: Fill Type A1

B. Cover and backfill: As indicated on the plans.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.03 BEDDING

A. Place bedding material at trench bottom and level materials in a continuous layer of minimum 4-inch compacted thickness, compact to achieve particle interlock.

B. Maintain moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with SSWSMCI, ASTM D2321, and manufacturer's instructions. Seal joints watertight.

B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 ft (3 m).

C. Install bedding material underneath pipe and at sides of pipe from pipe’s bottom to springline.

D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inch (300 m), compact to 95 percent of the maximum modified Proctor density.

E. Connect to building sewer outlet through installed sleeves or cored holes, and to manholes and municipal or existing storm sewer system.

3.05 INSTALLATION - CATCH BASINS AND CLEANOUTS

A. Install structures in accordance with SSWSMCI and manufacturer's instructions.

B. Form bottom of excavation clean and smooth to correct elevation. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.

C. Level top surface of base pad to receive concrete shaft sections, sleeved to receive storm sewer pipe sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated.

E. Mount lid and frame level in grout, secured to top cone section at elevation indicated.

3.06 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. All sewers and sewer structures shall be inspected by the Department of Sewers prior to final payment to the Contractor.

3.07 PROTECTION OF FINISHED WORK

A. Protect pipe and aggregate cover from damage or displacement until backfilling operations are complete.

END SECTION

334600
SUBDRAINAGE

PART 1 GENERAL

1.01 WORK INCLUDES

A. Base Bid:
   1. General Contractor:
      a. Responsible for all work in this section.

B. Alternate Bids: N/A

C. Unit Costs: N/A

1.02 RELATED DOCUMENTS

A. The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, Adopted April 1, 2016, shall be used for all applicable procedures in this section.
   1. The method of measurement identified in IDOT's Standard Specifications shall be utilized to record a final quantity amount required to complete the work contained in this section.
   2. The basis of payment identified in IDOT's Standard Specifications shall not be utilized to complete the work contained in this section.

B. Where the IDOT Standard Specifications do not provide enough guidance, the drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.03 SUMMARY

A. Section Includes:
   1. Perforated-wall pipe and fittings.
   2. Geotextile filter fabrics.

B. Related Requirements:
   1. Section 601 Pipe Drains, Pipe Underdrains, and French Drains of the IDOT Standard Specifications for Road and Bridge Construction, AdoptedJanuary 1, 2022 for subdrainage work noted in contract plans.
   2. Section 334200 Storm Sewer System

1.04 ACTION SUBMITTALS

A. Product Data:
   1. Drainage pipes, including rated capacities
   2. Geotextile filter fabrics.

PART 2 PRODUCTS

2.01 PERFORATED-WALL PIPES AND FITTINGS

A. Refer to the following Articles of the IDOT Standard Specifications for Road and Bridge Construction, Adopted January 1, 2022 for information dealing with the types of materials that may be used for perforate pipe and fittings:
   1. 1040.03 – Perforated Polyvinyl Chloride (PVC) Pipe.
   2. 1040.03 – Perforated Polyvinyl Chloride (PVC) Pipe with a Smooth Interior.
   3. 1040.04 – Perforated Polyvinyl Polyethylene (PE) Pipe.
   4. 1040.04 – Perforated Polyvinyl Polyethylene (PE) Pipe with a Smooth Interior.
   5. 1003.04 – Fine Aggregate for Bedding and Backfill.
   6. 1024.01 – Grout.

2.02 CLEAN OUTS

A. All other clean outs and covers:

1. Cast iron or ductile iron cleanout box, diameter to accept cleanout riser and cover with “S” “Sewer” or “cleanout” inscription. Manufactured by Bingham & Taylor. Finish to be black asphaltic coated.

B. Soil moisture testing clean out and cover:
1. Cast iron or ductile iron cleanout/monument box, internal diameter to accept 6” PVC riser with solid cover with no inscription or, “inspection pit”. Manufactured by Jones Stephens. Finish to be black asphaltic coated.

2.03 SOIL MATERIALS

A. Soil materials are specified in Section 312000 "Earth Moving."

2.04 GEOTEXTILE FILTER FABRICS

A. Description: Geotechnical Fabric materials shall adhere to Article 1080.05 of the IDOT Standard Specifications for Road and Bridge Construction, Adopted January 1, 2022.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.03 SUBDRAINAGE INSTALLATION

A. Adhere to Section 601.04 Pipe Underdrain Installation of the IDOT Standard Specifications for Road and Bridge Construction, Adopted January 1, 2022.

B. Perforated drainage pipes installed through tree pits, as shown on the plans, shall be installed with a geotextile filter fabric “sock” around the drainage pipe. The fabric shall be attached to the pipe in a manner to ensure that the entire segment of drainage pipe within the tree pit is wrapped in fabric that will not slide, shove, or move during installation of streetscape elements.

3.04 OTHER PIPE DRAIN INSTALLATION

A. Adhere to Section 601.03 Pipe Drain Installation of the IDOT Standard Specifications for Road and Bridge Construction, Adopted January 1, 2022

3.05 CLEAN OUT INSTALLATION

A. Comply with requirements for cleanouts specified in Section 334200 "Stormwater Conveyance."

B. Clean outs for Subdrainage:
1. Install cleanouts and riser extensions from piping to top of finished surface as shown on the plan and details. Locate cleanouts as shown on plans or as directed by the Engineer. Install fittings so cleanouts open in direction of flow in piping.

3.06 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END SECTION

SECTION 33 5200 - SANITARY SEWERSYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. The following specification contains scope to be performed by the Plumbing Prime Contractor.

B. Refer to multiple contract summary specification 011200 for detailed description of scope assigned to each Prime Contractor

1.2 WORK INCLUDES

A. Base bid:

1. Plumbing Contractor Provide

a. Sanitary sewerage drainage piping, manholes, structures, fittings, accessories and bedding and backfill.
b. Connection of sanitary drainage system to municipal sewers or existing sewer system.
c. Castings such as frames and grates or covers.

1.3 RELATED WORK

A. Section 31 20 00 – Earth Moving

B. Section 31 30 00 - Soil Erosion and Sedimentation Control

C. Section 31 40 00 - Excavating Backfilling and Compacting for Utilities

D. Section 31 41 00 – Acceptance of Backfill

1.4 REFERENCES

A. American National Standards Institute, (ANSI):

1. ANSI A21.11 – Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

B. American Society for Testing and Materials, (ASTM):

1. ASTM A74 - Specification for Cast Iron Soil Pipe and Fittings.
2. ASTM A746 - Specification for Ductile Iron Gravity Sewer Pipe.
3. ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
4. ASTM C14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

5. ASTM C14M - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe (Metric).
6. ASTM C76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
7. ASTM C76M - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
8. ASTM C425 - Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
9. ASTM C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
10. ASTM C564 - Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
11. ASTM C700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
12. ASTM D698 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu ft (600 kN-m/cu m)).
13. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).
14. ASTM D1785 - Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
15. ASTM D2321 - Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe for Sewers and Other Gravity Flow Applications.
16. ASTM D2729 - Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
17. ASTM D2751 - Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
18. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
19. ASTM D3017 - Test Methods for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
20. ASTM D3034 - Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

C. Illinois Society of Professional Engineers, (ISPE):

1. Standard Specification for Water and Sewer Main Construction in Illinois (SSWSMCI), 8th Edition,2020.

1.5 SUBMITTALS

A. Product Data: Provide data indicating pipe, and pipe accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Closeout Submittals:

1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of undocumented utilities.

1.6 REGULATORY REQUIREMENTS

A. Conform to 2012 regulations for Sewer Construction and Stormwater Management, Section 3.2 and 3.3 and SSWSMCI requirements for materials and installation of the Work of this section.

B. City of Evanston Code: Conform to applicable City of Evanston code for materials and installation of the work in this section.

C. City of Evanston Department of Sewers: Obtain required permits from City of Evanston Department of Sewers.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Extra-Strength Vitrified Clay Pipe:

1. Pipe: ASTM C700, Extra-Strength type, bell and spigot end.
2. Joint Device: ASTM C425, rubber gasket joint devices.
3. Installation: ASTM C12.

B. Polyvinyl Chloride (PVC) Pipe:

1. Pipe: ASTM D-3034, SDR 26
2. Joint Devise: Gasket joints conforming to ASTM D3212

C. Reinforced Concrete:

1. Pipe: ASTM C76, Class III Wall B.
2. Joint Device: ASTM C443, rubber gasket joint devices.

D. Cast Iron:

1. Pipe: ASTM A74, bell and spigot end.
2. Joint Device: ASTM C564, rubber gasket joint devices.

E. Ductile Iron Pipe:

1. Pipe: ASTM A746, Extra Heavy type Class 52 wall thickness, bell and spigot end.
2. Joint Device: ANSI A21.11, rubber gasket joint devices, or mechanical joints.

2.2 MANHOLES

A. Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints.

1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
2. Riser Sections: 4-inch minimum thickness; 48-inch diameter, and lengths to provide depth indicated.
3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Gaskets: ASTM C 443 (ASTM C 443M), rubber.

5. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match a 24-inch- diameter frame and grate.
6. Steps: ASTM C 478 (ASTM C 478M) individual steps or ladder. Omit steps for catch basins less than 60 inches deep.
7. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

B. Manhole Frames and Covers: ASTM A-48, Class 35B, cast gray iron per City of Evanston – Department of Water Management – 2012 Regulations for Sewer Construction and Stormwater Management (DWM). Include indented top design with lettering cast into cover:

1. Sanitary Drainage Piping Systems: Raised flush letters per DWM.

C. Sanitary manholes shall be properly benched to aid flow and prevent pooling or stagnation.

2.3 BEDDING MATERIALS

A. Bedding: Fill Type A1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 BEDDING

A. Place bedding material at trench bottom and level materials in a continuous layer of minimum 4-inch compacted thickness, compact to achieve particle interlock

B. Maintain moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with SSWSMCI, ASTM D2321, and manufacturer's instructions. Seal joints watertight.

B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 ft (3 m).

C. Install bedding at sides and over top of pipe to minimum compacted thickness of 4 inches, or as indicated on drawings. Thoroughly rod and tamp bedding under haunches of pipe.

D. Connect to building sanitary sewer outlet through installed sleeves or cored holes, and to municipal or existing sewer system.

E. Coordinate the Work with termination of sanitary sewer connection outside building, trenching, and connection to municipal or existing sewer utility service.

F. Where broken sewer is discovered, the Contractor shall replace the broken pipe and the work shall be paid for at the Contract Unit Price per lineal foot for storm sewer of the corresponding type and diameter.

3.5 INSTALLATION - STRUCTURES

A. Form bottom of excavation clean and smooth to correct elevation. Place bedding and compact with provision for sewer pipe end section. Establish elevations and pipe inverts for inlets and outlets as indicated. Place manholes, catch basins, and inlets on compacted bedding.

B. Install structures in accordance with SSWSMCI and manufacturer's instructions.

C. Mount lid frame and level in grout, secured to top cone or flat slab top section to elevation indicated.

D. Pipe Connections: Seal manhole pipe connections with non-shrinking grout.

3.6 CONNECTIONS

A. Make sewer service connections and downspout connections with service wyes or tees of the same type of material as the parent sewer.

B. Make connections to existing conduits and structures so that finished work will conform as nearly as practicable to requirements specified for new work. Use tee or wye saddle on existing sewers and structures. Do not allow proposed sewer to extend more than 1 inch into parent sewer. If the existing sewer pipe is cracked, broken, or otherwise damaged by the Contractor in making this circular opening, the Contractor shall replace this section of pipe with a pipe equal to the pipe of the existing sewer. The joint between the existing storm sewer and the proposed storm sewer shall be completely sealed with brick and mortar.

3.7 REMOVING PIPE AND STRUCTURES

A. Remove existing pipe, catch basins and inlets as indicated on the Drawings in accordance with Sections 551 and 605 of the IDOT Standard Specifications.

B. Excavate, as necessary, to remove pipe or structure and backfill with trench backfill in accordance with Section 02210. Dispose of all materials off site, in accordance with Article 202.03 of the IDOT Standard Specifications.

C. Existing manholes, catch basins, and inlets designated to be removed at locations where the existing inlet and/or outlet pipes are to be abandoned, shall be removed for the full depth of the

structure. If the abandoned pipes are not designated to be removed, the ends of the pipe at the structure shall be sealed with concrete or brick and mortar in a matter satisfactory to the Architect

3.8 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing bedding.

B. Perform compaction testing in accordance with ASTM D1557.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest at no cost to the Using Agency.

D. All sewers and sewer structures shall be inspected by the Department of Water Management prior to final payment to the Contractor.

3.9 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operations are complete.

END OF SECTION 33 5200

rubino
ENGINEERING INC.

REPORT TRANSMITTAL

December 4, 2023

To: Matt Mann, P.E.
Director of Public Works/Village Engineer
Village of Streamwood
565 S. Bartlett Rd.
Streamwood, IL 60107
630-736-3850

Re: **Geotechnical Engineering Services Report**
Kollar Park Pond Improvements
55 E Irving Park Road
Streamwood, Illinois

Rubino Report No. G23.178

Via email: mmann@streamwood.org

Dear Mr. Mann,

Rubino Engineering, Inc. (Rubino) is pleased to submit our Geotechnical Engineering Services Report for the proposed improvements at Kollar Park in Streamwood, Illinois.

Report Description

Enclosed is the Geotechnical Engineering Services Report including results of field and laboratory testing, as well as recommendations for foundation design, pavement design, and general site development.

Authorization and Correspondence History

- Rubino Proposal No. Q23.505g_REV1 dated October 17, 2023; Signed and authorized by Matt Mann, PE, Director of Public Works/Village on October 18th, 2023.

Closing

Rubino appreciates the opportunity to provide geotechnical services for this project and we look forward to continued participation during the design and in future construction phases of this project.

If you have questions pertaining to this report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully submitted,
RUBINO ENGINEERING, INC.

Michelle A. Lipinski, PE
President

michelle.lipinski@rubinoeng.com

MAL/file/ Enclosures

Geotechnical Engineering Services Report

KOLLAR PARK POND IMPROVEMENTS

55 E IRVING PARK ROAD

STREAMWOOD, ILLINOIS

RUBINO PROJECT NO. G23.178

Drilling
Laboratory Testing
Geotechnical Analysis

PREPARED BY:

SABINA SCHMID

rubino ENGINEERING INC.

Michelle A. Lipinski, PE
President
IL No. 062-061241, Exp. 11/30/25

PREPARED FOR:

VILLAGE OF STREAMWOOD

565 S. BARTLETT ROAD

STREAMWOOD, ILLINOIS 60107

DECEMBER 4, 2023

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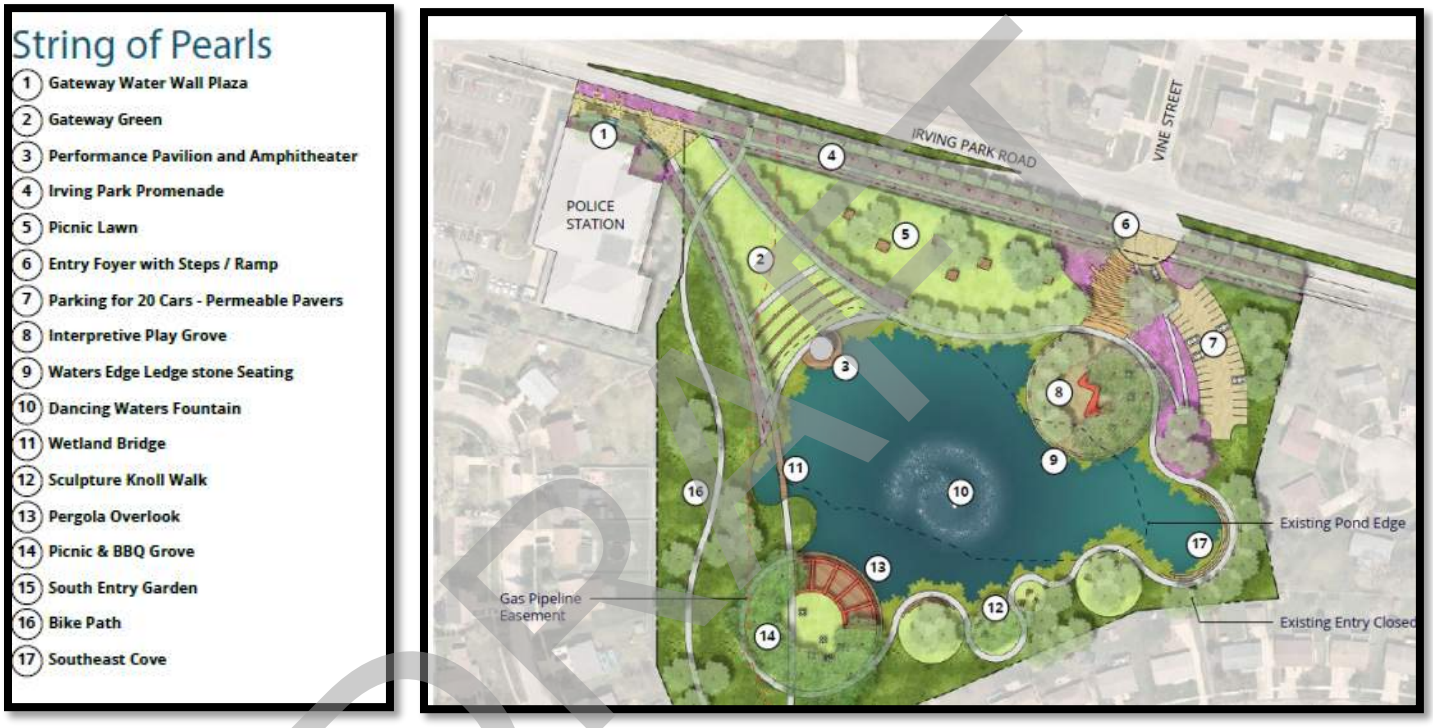
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PROJECT INFORMATION

Rubino understands that the Village of Streamwood is planning improvements to Kollar Pond and the surrounding park and parking lot. Kollar Pond is an existing pond located on the south side of Irving Park Road at Vine Street in Streamwood, Illinois

The improvements are currently planned to include the following:



DRAFT

Structural Loads received: none; however this proposal is based on the following:

- Individual column loads not exceeding 40 kips
- Bearing wall loads not exceeding 4 kips per lineal foot (klf)
- Grade-supported slab live loads not exceeding 100 psf.
- Site grading in the structural areas including cuts and fills being less than 2 feet

Documents received:

- Drawing – Boring Location plan provided by the Village of Streamwood, shown herein.

Project Correspondence:

- RFP email and information from Matt Mann of the Village of Streamwood on October 6 and 9, 2023 and phone call on October 17, 2023.
- Soil boring elevations received from Matt Mann of the Village of Streamwood, on November 1, 2023

The geotechnical recommendations presented in this report are based on the available project information and the subsurface materials described in this report. If any of the information on which

this report is based is incorrect, please inform Rubino in writing so that we may amend the recommendations presented in this report (if appropriate, and if desired by the client). Rubino will not be responsible for the implementation of our recommendations if we are not notified of changes in the project.

Purpose / Scope of Services

The purpose of this study was to explore the subsurface conditions at the site in order to prepare geotechnical recommendations for foundation design, pavement design, and general site development for the proposed construction. Rubino's scope of services included the following drilling program:

Table 1: Drilling Scope

NUMBER OF BORINGS	NUMBER OF SOIL PROBES	DEPTH (FEET BEG*)	LOCATION
6	--	10	B-01 (Proposed Gateway Water Well Plaza) B-02 (Proposed Entry Foyer) B-03 (Proposed Permeable Paver Parking Lot) B-04 (Proposed Pond Extension) B-05 (Proposed Southeast Cove) B-06 (Near Proposed Sculpture Knoll Walk)
4	--	20	B-07 (Proposed Performance Pavilion and Amphitheater) B-08 (Proposed Wetland Bridge) B-09 (Proposed Interpretive Play Grove) B-10 (Proposed Pergola Overlook)
--	5	2 – 3	P-01 through P-05 (Existing Pond)

*BEG = below existing grade

Representative soil samples obtained during the field exploration program were transported to the laboratory for additional classification and laboratory testing.

This report briefly outlines the following:

- *Summary of client-provided project information and report basis*
- *Overview of encountered subsurface conditions*
- *Overview of field and laboratory tests performed including results*
- *Geotechnical recommendations pertaining to:*
  - *Subgrade preparation and cut / fill recommendations*
  - *Shallow foundations for play structures at the interpretive playground, including suitable foundation type(s), allowable bearing pressure(s), and estimated settlement*
  - *Preliminary foundation discussion for wetland bridge, pavilion, and pergola overlook*
  - *Seismic design site classification parameters*

- *Permeable pavements, including subgrade stability and undercut recommendations, as applicable.*
- *Sheet pile walls along pond perimeter, including lateral earth pressure recommendations*
- *Re-use of on-site material as fill (included per phone call with Matt Mann on October 17, 2023)*

- *Construction considerations, including temporary excavation and construction control of water*

DRILLING, FIELD, AND LABORATORY TEST PROCEDURES

The Village of Streamwood selected the number of borings and the boring depths. Rubino located the borings in the field by measuring distances from known fixed site features. The borings were advanced utilizing 2 ¼ inch inside-diameter, hollow stem auger drilling methods and soil samples were routinely obtained during the drilling process.

Selected soil samples were tested in the laboratory to determine material properties for this report. Drilling, sampling, and laboratory tests were accomplished in general accordance with ASTM procedures. The following items are further described in the Appendix of this report.

- *Field Penetration Tests and Split-Barrel Sampling of Soils (ASTM D1586)*
- *Field Water Level Measurements*
- *Laboratory Determination of Water (Moisture) Content of Soil by Mass (ASTM D2216)*
- *Laboratory Determination of Atterberg Limits (ASTM D4318)*
- *Laboratory Determination of Particle Size (Hydrometer) Analysis of Soils (ASTM D422)*
- *Laboratory Organic Content by Loss on Ignition (ASTM D2974)*

The laboratory testing program was conducted in general accordance with applicable ASTM specifications. The results of these tests are to be found on the accompanying boring logs located in the Appendix.

SUMMARY OF GEOTECHNICAL CONSIDERATIONS

The main geotechnical design and construction considerations at this site are:

GENERAL

- **Subgrade soils** generally consisted of undocumented fill, brown, black, and/or gray silty clay, gray silt, and organic silty clay. See *Subsurface Conditions* and *Undocumented Fill Discussion* sections for more detailed information.
    - **Organic soils were observed** at some of the boring locations during drilling operations. See *Subsurface Conditions* and *Organic Soils Discussion* sections for more detailed information.

PARKING AREAS

- Based on the observed soil types, SPT N-values and Qp values, subgrade stability recommendations have been provided for the proposed permeable pavers parking lot and the pavement in the Entry Foyer area along the Sculpture Knoll Walkway. See *Subgrade Stability / Undercut Recommendations – Proposed Parking Lot & Entry Foyer Pavement* section for more detailed information.

STRUCTURES

- Shallow Foundations are a possible foundation design option for the proposed play structures in the proposed interpretive play grove area. See *Preliminary Shallow Foundation Discussion – Interpretive Play Grove* section for more information.

- Shallow foundations are not recommended for the proposed Performance Pavilion and Amphitheater, Wetland Bridge, and Pergola Overlook areas. Additional borings at a deeper depth will need to be performed in these areas. See *Preliminary Deep Foundation Discussion: Proposed Performance Pavilion/Amphitheater, Wetland Bridge, & Pergola Overlook* section for more information.

POND

- Soil samples taken from within the pond were classified as organic silty clayey sand and poorly-graded gravel. See the *Pond Samples Table* located in the Appendix of this report for more detailed information.

- Sheet pile walls are proposed along the pond perimeter. Please see the *Preliminary Lateral Earth Pressure Recommendations - Pond Sheet Piling* section for more information.

The geotechnical-related recommendations in this report are presented based on the subsurface conditions encountered and Rubino's understanding of the project. Should changes in the project criteria occur, a review must be made by Rubino to determine if modifications to our recommendations will be necessary.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The project site is Kollar Park located on the south side of Irving Park Road at 55 E Irving Park Road in Streamwood, Illinois. Topography of the park is bowl-shaped and slopes towards the pond at the center. The Park's existing amenities include a walking path around the pond, a playground, and a shelter.



Subsurface Conditions

Beneath the existing surficial pavement, undocumented fill soils, or gravel, subsurface conditions generally consisted of brown, black, and/or gray silty clay, brown and gray clayey silt, and brown silty sand.

- The **topsoil** thicknesses, visually observed at boring locations ranged between approximately 6 and 12 inches
- The **undocumented fill and possible fill** soils were generally cohesive in nature
- The native **silty clay** soils ranged from soft to very stiff in consistency

Table 2: Subsurface Conditions Summary

APPROXIMATE ELEVATION RANGE, FEET (DEPTH RANGE, FEET BEG*)	SOIL DESCRIPTION	SPT N-VALUES (BLOWS PER FOOT)	MOISTURE CONTENT (%)	ESTIMATED SHEAR STRENGTH
B-01 through B-06 Gateway Water Well Plaza, Entry Foyer, Permeable Paver Parking Lot, Pond Extension, Southeast Cove, Sculpture Knoll Walk				
805 ¼ – 798 ½ (1 – 8 ½)	Dark brown / brown, dark gray / gray, and black silty CLAY, trace sand and gravel, *Possible Fill* *(B-03, B-04 & B-05)*	6 – 13	17 – 31	---
804 – 794 ½ (1 – 8 ½)	Black / dark brown ORGANIC SILTY CLAY *(B-02 & B-06)*	3 – 8	32 – 62	---
803 – 789 ½ (1 – 10)	Soft to medium stiff, brown / gray silty CLAY, trace sand and gravel *(B-01, B-03 & B-06)*	3 – 6	19 – 24	c = 450 – 900 psf
799 ¼ - 795 ¼ (6 – 10)	Black and dark gray HIGH PLASTICITY SILTY CLAY, *Possible Fill (B-05)*	4 – 6	44 – 78	---
798 ½ - 792 (6 – 10)	Stiff to very stiff, brown and gray silty CLAY *(B-01, B-02, B-04)*	8 – 11	16 – 21	c = 1,200 – 1,650 psf
789 ½ – 798 (8 ½ – 10)	Medium stiff, gray SILT *(B-06)*	10	10	c = 700 – 800 psf
B-07 through B-09 Performance Pavilion and Amphitheater, Wetland Bridge, Interpretive Play Grove, Pergola Overlook				
802 ¼ – 799 ¾ (½ – 3 ½)	FILL: brown and dark brown silty clay *(B-10)*	3	20	—
799 ½ – 792 ¼ (1 – 8 ½)	Stiff to very stiff, brown / dark brown silty CLAY *(B-09)*	12 – 15	12 – 16	c = 1,200 – 2,250 psf
797 ¼ – 794 ¾ (1 – 3 ½)	Dark gray and black ORGANIC SILTY CLAY *(B-07 & B-08)*	0 – 1	89 – 127	—
799 ¼ – 791 ¾ (3 ½ – 11)	Black and dark gray silty CLAY, *Possible Fill (B-10)*	2 – 4	34 – 103	—
794 ¾ – 784 ¾ (3 ½ – 13 ½)	Very soft to soft, gray silty CLAY	2 – 5	17 – 22	c = 300 – 750 psf
792 – 778 ¼ (8 ½ –20)	Medium stiff to stiff, gray / brown silty CLAY	5 – 12	14 – 22	c = 750 – 1,800 psf

*BEG = Below existing grade

The native soils were visually classified as silty clay (CL), silt (ML), high plasticity silty clay (CH) and organic silty clay (OL) according to the Unified Soil Classification System (USCS). The above table is a general summary of subsurface conditions. Please refer to the boring logs for more detailed information.

Estimated shear strength of clay soils is based on empirical correlations using N-values, moisture content, and unconfined compressive strength.

Groundwater Conditions

Free groundwater was not observed in the borings during the drilling operations, possibly due to the lower permeability of the fine-grained soils. However, due to the proximity to the pond, water may be encountered during excavation at this site.

It should be noted that fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. Groundwater may not have been observed in some areas due to the low permeability of soils. Additionally, discontinuous zones of perched water may exist within the soils. The possibility of groundwater level fluctuation should be considered when developing the design and construction plans for the project.

Organic Soils Discussion

Organic soils greater than 10% loss on ignition were observed in borings B-02, B-06, B-07, and B-08 at this site. Visible organic matter was observed in borings B-04 and B-10. Please see the table below for details.

Organic soils can later cause settlement or stability problems. If encountered during construction, Rubino recommends that organic soils be removed and replaced with a compacted and documented engineered fill unless otherwise noted in the report.

Organic soils are defined as soils containing visible organic matter or greater than 10% organic matter as measured in a laboratory loss on ignition test. Organic soils typically consist of decomposed plant material accumulated under conditions of excessive moisture. Organic soils are dark colored in nature and may exhibit the odor of decaying vegetation.

Table 3: Organic Content by Location

BORING NUMBER / LOCATION	APPROXIMATE DEPTH RANGE (FEET BEG*)	ORGANIC LOSS ON IGNITION LOI%
B-02 / Entry Foyer	1 – 8 ½	12 – 17%
B-04 / Pond Extension	1 – 3 ½	Organic Matter Observed
B-06 / Sculpture Knoll Walk	1 – 3 ½	10%
B-07 / Performance Pavilion & Amphitheater	1 – 3 ½	12%
B-08 / Wetland Bridge	1 – 3 ½	10%
B-10 / Pergola Overlook	8 ½ – 11	Organic Matter Observed

*BEG = below existing grade

Undocumented Fill Discussion

Undocumented fill and possible fill were observed in the borings to depths of approximately 3 ½ to 11 feet below existing grade. Where existing fill is encountered, Rubino recommends that structure foundations extend through the fill materials and be supported on suitable soils, intermediate foundations, cured flowable fill, or compacted and documented structural fill. See the *Preliminary Shallow Foundation Discussion – Interpretive Play Grove* and *Preliminary Foundation Discussion: Proposed Performance Pavilion/Amphitheater, Wetland Bridge, & Pergola* Overlook sections for more details.

Undocumented fill is defined as fill that has been placed without being documented as to its placed density and moisture content.

Deleterious materials could include, but are not limited to, bricks, asphalt, concrete, metal, wood, or other building debris.

Deleterious materials were not observed within the undocumented fill materials during the drilling operations. Although deleterious materials were not encountered in the undocumented fill materials, this does not eliminate the possibility that deleterious materials could be present within the undocumented fill materials at other locations along the project.

If encountered during construction, fill with deleterious materials should be removed and replaced with structural fill at the geotechnical field engineer's discretion at the time of construction.

The primary risk of supporting structures on undocumented/uncontrolled fill materials is the potential for excessive and/or non-uniform settlement. The non-uniformity concern is based on the lack of information regarding how the fill was originally placed. Without documentation, Rubino cannot make an assessment as to whether or not the fill materials between the boring are consistent with what was explored. Risk of fill settlement can be reduced if the existing fill is removed and replaced with a controlled and compacted structural fill, or if records documenting the placement and compaction of the fill can be located.

Topsoil Discussion

Topsoil materials as described in this report have not been analyzed for quality according to any minimum specifications. If topsoil is to be imported to or exported from this site, Rubino recommends that it meet the minimum specifications defined in **Section 1081.05** of the, "Standard Specifications for Road and Bridge Construction," adopted by the Illinois Department of Transportation, January 1st, 2022.

Rubino has reported topsoil thicknesses at each boring based on visual observation of surficial soils. Surficial topsoil thickness was visually observed to be between approximately 6 and 12 inches.

EVALUATION AND RECOMMENDATIONS

The geotechnical-related recommendations in this report are presented based on the subsurface conditions encountered and Rubino's understanding of the project. Should changes in the project criteria occur, a review must be made by Rubino to determine if modifications to our recommendations will be necessary.

Site Preparation & Fill Recommendations

The following comments are considered preliminary. To reference general subgrade preparation recommendations and compaction recommendations, please refer to the Appendix of this report.

- Prior to placing and compacting structural fill, the site should be cleared of vegetation, trees, roots, unstable soils (low shear strength, high moisture content), and deleterious materials as applicable.
    - Soils that meet the requirements for structural fill should be stockpiled as needed for mass grading. Moisture conditioning weather and timing should be planned when considering the construction schedule.

- Please note that clay subgrade soils are sensitive to moisture and can be easily disturbed by precipitation, groundwater, or construction equipment. Therefore, extra care should be used to avoid disturbing these soils during construction activities.

- If cohesive soils become wet or unstable during construction, or if near surface soft subgrade soils are encountered, it is recommended that coarse aggregate be placed on the subgrade until a stable base for compaction of fill is achieved. The coarse aggregate should consist of clean, crushed stone or gravel between ¼ and 3 inches in size. The coarse aggregate should be spread in a maximum of 6-inch layers and compacted with compaction equipment until it is worked as much as possible into the existing soft or loose soil. This will "lock" up the unstable soil and create a bridging-type affect. Filter fabric should be placed between open-graded stone and fine-grained soils.

Suitability of On-Site Soils for Use as Structural Fill

Where fill materials are required, the fill materials for construction must meet the requirements of the Appendix of this report. Composite soils planned to be used for fill need to be blended to have a consistent classification. Soils should be stockpiled separately by classification and tested as recommended in the Appendix. For budget purposes, Rubino recommends a shrinkage factor of 15 percent be used to determine earthwork quantities.

In general, the **lean medium stiff to very stiff, brown / gray silty clay (CL) soils** (moisture contents ranging from 15% - 21%) that were encountered in the borings appear to be suitable for re-use as structural fill, **however, these soils were generally encountered in the deeper layers of the borings (between approximately 6 and 20 feet below existing grade; ≅ EL. 797 ½ - 778 ¼ feet) with the exception of borings B-04 and B-09.**

- B-04: The lean stiff to very stiff, brown / gray silty (CL) soils that were encountered in boring B-04 (in the proposed Pond Extension area) between approximately 3 ½ and 10 feet below existing grade (≅ EL. 798 ½ – 792 feet) appear to be generally suitable for re-use as structural fill.

- B-09: The lean medium stiff to very stiff brown / dark brown / gray silty clay (CL) soils that were encountered in boring B-09 (in the proposed Interpretive Play Structure area) between approximately 1 and 20 feet below existing grade (≅ EL. 799 ½ – 780 ½ feet) appear to be generally suitable for re-use as structural fill.

- Soils should be stockpiled and tested to confirm suitability for re-use as structural fill at the time of construction.

Please note that the soft silty clay material, dark brown / black silty clay material, black organic silty clay material, undocumented fill, and possible fill soils that were encountered in the borings are generally unsuitable for re-use as structural fill. Please reference the boring logs in the Appendix of this report for more details on the observed soils at this site.

Fine-grained soils that will be reused will likely need to be moisture conditioned prior to placement; therefore, construction should be planned in warm and dry months of the year. Fill materials should be compacted and documented and meet the fill requirements shown in the Appendix of this report. Please reference the boring logs and laboratory results in the Appendix of this report for more information on the soil observed on site. To reference general subgrade preparation recommendations and compaction recommendations, please refer to the Appendix of this report.

Proposed grading plans were not available at the issue of this report and Rubino requests to be notified once proposed construction plans / drawings and grading plans can be provided so that recommendations can be updated accordingly.

Proposed Parking Lot and Entry Foyer Pavement

The recommendations located in this section are based on the data obtained at the soil boring locations at / near the proposed pavement at the Entry Foyer area (B-02) and the proposed permeable pavers parking lot (B-03). Soil subgrade stability may vary in the field between the borings and could be affected by the weather at the time of construction.

- The IDOT IBV Based Remedial Action chart from the IDOT Subgrade Stability Manual was used as a reference.
- Subgrade with an IBV value of 5 or less is a candidate for additional remediation.
- Subgrade with a moisture content exceeding 25% may be a candidate for remedial action as determined by proofroll and penetrometer testing at the time of construction.

Rubino recommends including a nominal quantity of 25% for subgrade improvement in case of failed proofroll or subgrade stability testing at the time of construction.

Table 4: Estimated IBV and Undercut Recommendations

BORING	IBV VALUE	REMEDIAL THICKNESS (UNDERCUT)	GEOTECHNICAL CONSIDERATIONS
Proposed Entry Foyer Pavement			
B-02	0	TBD – Delineation borings recommended once the site plan is finalized	Black ORGANIC SILTY CLAY at approximately 1 – 8 ½ feet below existing grade (≅ EL. 804 – 796 ½ feet)
Proposed Permeable Pavers Parking Lot			
B-03	3 – 5	Nominal Quantity	Possible Fill: dark brown, black, and gray silty clay at approximately 1 – 3 ½ feet below existing grade (≅ EL. 807 ¾ – 805 ¼ feet) Qp = 4.5 tsf

Subgrade stability should be checked during construction in accordance with *Appendix B*. Please note that proposed grading plans were not provided to Rubino, therefore, the recommendations and considerations above are based on the existing grade in the proposed pavement area. Once proposed grading and / or plans are finalized, please notify Rubino so that subgrade stability recommendations can be updated accordingly, if necessary.

If unstable soils are encountered at the time of testing during construction, subgrade soils may be **stabilized** by one of the following **options**:

- **Remove and replace** with non-woven filter fabric and 3-inch stone capped with CA-06 stone.

- Please note that a layer of non-woven filter geotextile should be placed between silty clay soil and an open-graded stone.

- Please be aware that large amounts of open-graded stone placed on the site will attract groundwater. Please notify the Civil Engineer of record if this option is chosen.

Where organic soils are encountered, Rubino recommends the following:

- **Remove and replace** with structural fill.

- Lightweight fill can be considered instead of removing all of the organic soils depending on final design. Additional borings are recommended to delineate areas of organic soils under proposed pavements.

General Soil Discussion – Borings B-01, B-05, & B-06

The following paragraphs generally discuss the soil conditions encountered at borings B-01, B-05, & B-06. Please notify Rubino once proposed construction plans / drawings and grading plans can be provided so that recommendations can be updated accordingly. The soil in these areas should be carefully tested to determine strength as required at the time of construction.

Gateway Water Well Plaza area (B-01)

The boring performed in the proposed Gateway Water Well Plaza area (B-01) consisted of soft to medium stiff brown and gray silty clay from approximately ½ to 6 feet below existing grade (≅ EL. 803 – 797 ½ feet), underlain by stiff brown and gray silty clay soils.

- The *soft silty clay layer* located at approximately 3 ½ – 6 feet below existing grade (≅ EL. 800 – 797 ½ feet) may not be suitable for support of proposed construction in this area and may need to be removed if exposed at the time of construction.

Southeast Cove area (B-05)

The boring performed in the proposed Southeast Cove area (B-05) consisted of dark brown and black silty clay *(Possible Fill)* from approximately 1 – 10 feet below existing grade (≅ EL. 804 ½ – 795 ¼ feet).

- The *black / dark gray high plasticity silty clay soils (Possible Fill)* encountered in this boring at approximately 6 – 10 feet below existing grade (≅ EL. 799 ¼ – 795 ¼ feet) were found to have elevated moisture contents ranging from 44% to 78% and may not be suitable for support of proposed construction in this area.

Boring B-06

Boring B-06 was performed in the southern portion of the site, near the proposed Sculpture Knoll Walkway. This boring consisted of dark brown organic silty clay from approximately 1 – 3 ½ feet below existing grade (≅ EL. 797 – 794 ½ feet), underlain by soft, gray silty clay and stiff, gray silt layers.

If encountered during construction, Rubino recommends that organic soils be removed and replaced with a compacted and documented engineer fill. The soils beneath the organic silty clay soils should be carefully tested at the time of construction.

Preliminary Lateral Earth Pressure Recommendations - Pond Sheet Piling

Per the phone call between Rubino and Matt Mann (Village of Streamwood) on October 17, 2023, sheet piling is being considered at the edges of the pond near the proposed Southeast Cove, the proposed Interpretive Play Grove, and the proposed Pergola Overlook (near boring locations B-05, B-09, and B-10, respectively). Once plans are finalized, additional borings may be needed to finalize sheet pile recommendations. Please see below for the preliminary lateral earth pressures based on the soils encountered at the aforementioned borings.

Lateral earth pressures will be influenced by the conditions of wall or support restraint, methods of construction and/or compaction and the strength of the materials being restrained. The lateral earth pressures are determined by multiplying the vertical applied pressure by the appropriate lateral earth pressure coefficient “k”.

The following table provides the recommended “at-rest,” “active,” and “passive” lateral earth pressure coefficients for the soils encountered on site at the soil boring locations specified.

Table 5: “K-Factor” Lateral Earth Pressures

Approximate Elevation, feet (Depth, feet BEG*)	Soil Description	Estimated Total Unit Weight (lb/ft^3)	Friction Angle (deg)	K_o	K_A	K_P
B-05 (Proposed Southeast Cove)						
804 ½ – 795 ¼ (1 – 10)	Possible Fill: Dark brown and black silty CLAY / Black and dark gray HIGH PLASTICITY SILTY CLAY	105 – 115	25°	0.58	0.41	2.46
B-09 (Proposed Interpretive Play Grove)						
799 – 792 (1 – 8 ½)	Stiff to very stiff, brown and dark brown silty CLAY	120 – 125	27°	0.55	0.38	2.66
792 – 780 ½ (8 ½ – 20)	Medium stiff to stiff, brown and gray silty CLAY	115 – 120	26°	0.56	0.39	2.56
B-10 (Proposed Pergola Overlook)						
802 ¼ – 784 ¼ (1 – 18 ½)	Black, gray, brown and dark brown silty clay (FILL and Possible Fill) / Soft silty CLAY	105 – 115	24°	0.59	0.42	2.37
784 ¼ – 782 ¾ (18 ½ – 20)	Stiff, gray silty CLAY	120	26°	0.56	0.39	2.56

The following equations were used to calculate the earth pressure coefficients "k".

At-Rest:	$k_o = 1 - \sin\phi$	If the walls are rigidly attached to the structure and not free to rotate or deflect at the top such as shallow tunnels
Active:	$k_a = \tan^2(45 - \frac{\phi}{2})$	Walls that are permitted to rotate and deflect at the top
Passive:	$k_p = \tan^2(45 + \frac{\phi}{2})$	Passive pressure should be determined using a factor of safety of 2.0

Conditions applicable to the above coefficients include:

- For active earth pressure, wall must rotate about base, with top lateral movements 0.002Z to 0.004Z, where Z is the wall height
- For passive earth pressure, wall must move horizontally to mobilize resistance
- No safety factor included
- Ignore passive pressure within the frost depth zone (3 ½ feet below final grade)
- The minimum factor of safety for overturning analysis is 2

Preliminary Shallow Foundation Discussion – Interpretive Play Grove

Design – Soil Bearing Pressure

Shallow, spread footing foundations may be considered for support of the proposed play structures in the proposed interpretive play grove area on site. Please note that no proposed drawings or construction plans have been provided to Rubino for the play structures at the issue of this report. The following recommendations are considered preliminary, pending more information. Please notify Rubino once proposed construction plans / drawings and grading plans can be provided so that recommendations can be finalized.

The boring performed in the proposed Interpretive Play Grove area (B-09) consists of Stiff to very stiff, brown / dark brown silty clay soils underlain by medium stiff to stiff, brown / gray silty clay. **The stiff to very stiff, brown and dark brown silty clay soils were encountered in this boring from approximately 1 – 8 ½ feet below existing grade (≅ EL. 799 ½ - 792 feet) and are estimated to have an unconfined compressive strength of approximately 2.0 – 4.0 tsf.**

Rubino can provide settlement estimate and discussion once the proposed construction plans / drawings and grading plans are provided.

Preliminary Foundation Discussion: Proposed Performance Pavilion/Amphitheater, Wetland Bridge, & Pergola Overlook

The soils encountered between approximately 1 and 18 ½ feet below existing grade (≅ EL. 802 – 784 ½ feet) in the borings at the proposed performance pavilion/amphitheater (B-07), the proposed wetland bridge (B-08), and the proposed pergola overlook (B-10) generally consisted of undocumented fill, dark gray / black organic silty clay, and very soft to medium stiff black / dark

gray / gray / brown silty clay. Because the borings B-07, B-08, and B-10 exhibit low to moderate strength soils and unsuitable bearing soils in the majority of the soil profile, Rubino recommends that the corresponding proposed structures are supported by deep foundation systems.

Stiff native silty clay soils were encountered beneath the unsuitable bearing soils in boring B-07 between approximately 11 and 20 feet below existing grade (≅ EL. 787 – 778 feet) and in borings B-08 and B-10 between approximately 18 ½ and 20 feet below existing grade (≅ EL. 784 ½ – 778 feet).

Rubino recommends that additional borings are performed to deeper depths in order to obtain adequate information to provide final bearing capacity recommendations for the proposed Performance Pavilion/Amphitheater, Wetland Bridge, and Pergola Overlook construction.

Preliminary Seismic Design Site Classification

Rubino recommends that additional borings are performed to deeper depths in order to obtain adequate soil information for finalized foundation recommendations for the proposed Performance Pavilion/Amphitheater, Wetland Bridge, and Pergola Overlook construction.

Based on the boring data available at this time, Rubino estimates that the project area is in Seismic Site Class D or E. Once the additional borings are performed and final proposed bearing elevations can be provided, Rubino will update the Seismic Design Site Classification accordingly.

Recommendations for Additional Testing

Please notify Rubino once proposed drawings / plans and grading plans can be provided so that we can review our recommendations for the direct use of the structure and development of the site and update the report. Please see the table below for more specific details on the additional testing and information that is recommended for this project.

BORING	LOCATION / PROPOSED AREA	ADDITIONAL TESTING AND INFORMATION NEEDED TO FINALIZE RECOMMENDATIONS
B-01	Gateway Water Well Plaza	• Updated site civil plan • Grading Plans • *May need additional or deeper borings in the area for pond perimeter sheet pile recommendations
B-02	Entry Foyer	
B-03	Permeable Paver Parking Lot	
B-04	Pond Extension	
B-05	Southeast Cove*	
B-06	Southern area of site, near portion of the Sculpture Knoll Walk	
B-07	Performance Pavilion and Amphitheater	• Additional borings to deeper depths • Updated site civil plan • Structure type, loads and locations • Proposed Bearing Elevation
B-08	Wetland Bridge	
B-09	Interpretive Play Grove	

BORING	LOCATION / PROPOSED AREA	ADDITIONAL TESTING AND INFORMATION NEEDED TO FINALIZE RECOMMENDATIONS
B-10	Pergola Overlook	• Grading Plans

During construction, Rubino recommends that one of our representatives be onsite for typical **observations and documentation** of exposed subgrade for during excavation and grading activities for support of floor slabs, foundations, and pavements, including proofrolling and penetrometer testing.

CLOSING

The recommendations submitted are based on the available subsurface information obtained by Rubino Engineering, Inc. and design details furnished by Village of Streamwood for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Rubino should be notified immediately to determine if changes in the foundation recommendations are required. If Rubino is not retained to perform these functions, we will not be responsible for the impact of those conditions on the project.

The scope of services did not include an environmental assessment to determine the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater or air on, below, or around this site. Any statements in this report and/or on the boring logs regarding odors, colors, and/or unusual or suspicious items or conditions are strictly for informational purposes.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Village of Streamwood and their consultants for the specific application to the proposed improvements at Kollar Park in Streamwood, Illinois.

Appendix A – Drilling, Field, and Laboratory Test Procedures

ASTM D1586 Penetration Tests and Split-Barrel Sampling of Soils

During the sampling procedure, Standard Penetration Tests (SPT's) were performed at regular intervals to obtain the standard penetration (N-value) of the soil. The results of the standard penetration test are used to estimate the relative strength and compressibility of the soil profile components through empirical correlations to the soils' relative density and consistency. The split-barrel sampler obtains a soil sample for classification purposes and laboratory testing, as appropriate for the type of soil obtained.

Water Level Measurements

Water level observations were attempted during and upon completion of the drilling operation using a 100-foot tape measure. The depths of observed water levels in the boreholes are noted on the boring logs presented in the appendix of this report. In the borings where water is unable to be observed during the field activities, in relatively impervious soils, the accurate determination of the groundwater elevation may not be possible even after several days of observation. Seasonal variations, temperature and recent rainfall conditions may influence the levels of the groundwater table and volumes of water will depend on the permeability of the soils.

Ground Surface Elevations

Ground surface elevations that are referenced on the attached boring logs and throughout the report were provided to Rubino by Matt Mann via email on November 1, 2023. The depths indicated on the attached boring logs are relative to the existing ground surface for each individual boring at the time of the exploration. Copies of the boring logs are located in the Appendix of this report.

ASTM D2216 Water (Moisture) Content of Soil by Mass (Laboratory)

The water content is an important index property used in expressing the phase relationship of solids, water, and air in a given volume of material and can be used to correlate soil behavior with its index properties. In fine grained cohesive soils, the behavior of a given soil type often depends on its natural water content. The water content of a cohesive soil along with its liquid and plastic limits as determined by Atterberg Limit testing are used to express the soil's relative consistency or liquidity index.

ASTM D2974 Standard Test Method for Organic Soils using Loss on Ignition (Laboratory)

These test methods cover the measurement of moisture content, ash content, and organic matter in peats and other organic soils, such as organic clays, silts, and mucks. Ash content of a peat or organic soil sample is determined by igniting the oven-dried sample from the moisture content determination in a muffle furnace at 440°C (Method C) or 750°C (Method D). The substance remaining after ignition is the ash. The ash content is expressed as a percentage of the mass of the oven-dried sample. 2.4 Organic matter is determined by subtracting percent ash content from 100.

ASTM D4318 Atterberg Limits (Laboratory)

Atterberg limit testing defines the liquid limit (LL) and plastic limit (PL) states of a given soil. These limits are used to determine the moisture content limits where the soil characteristics changes from behaving more like a fluid on the liquid limit end to where the soil behaves more like individual soil particles on the plastic limit end. The liquid limit is often used to determine if a soil is a low or high plasticity soil. The plasticity index (PI) is difference between the liquid limit and the plastic limit. The plasticity index is used in conjunction with the liquid limit to determine if the material will behave like a silt or clay.

ASTM D422 Particle Size Analysis (Laboratory)

The Particle Size Analysis of Soils determines the distribution of particle sizes in order to further classify the soil. The distribution of particle sizes larger than 75µm (retained on the No. 200 sieve) is determined by sieving, while the distribution of particle sizes smaller than 75µm is determined by a sedimentation process, using a hydrometer to secure the necessary data. These soils are then classified more accurately based on the distribution information.

Appendix B – Site Preparation – Clearing & Grubbing

Rubino recommends that unsuitable soils or fill be removed from the site, as applicable. Unsuitable soils or fills can be described as, but are not limited to:

- organic soil / topsoil / plants / trees / shrubs / grass
- frozen soil
- existing asphalt or concrete pavement sections
- existing foundations
- building debris
- existing curbs

Stripping operations should extend a minimum of: **10** feet beyond proposed building limits and **5** feet beyond proposed pavement limits

Exceptions: where property limits allow. Notify geotechnical engineer if there are property boundary limitations. Stripping operations should be monitored and documented by a representative of the geotechnical engineer at the time of construction.

Proofrolling:

After stripping and excavating to the proposed subgrade level, as required, the paved parking area should be proof-rolled and scarified and compacted to at least 95 percent of the standard Proctor maximum dry density ASTM D 698 for a depth of at least 8 inches below the surface during a period of dry weather.

Proofrolling Equipment:

Tandem-axle dump truck or similar rubber-tired vehicles are acceptable and should be loaded with at least 9 tons per axle.

Benefits of Proofrolling:

- Aids in providing a firm base for compaction of fill soils
- Helps to delineate soft, loose, or disturbed areas that may exist below subgrade level.

Subgrade Stability:

Soils which are observed to rut or deflect excessively (typically greater than 1 inch) under the moving load should either be scarified and re-compacted, or undercut and replaced.
Subgrade soils may be **stabilized** by one of the following **options**:

- **Scarifying and re-compacting** the existing subgrade soil to at least 95% compaction per ASTM D698 Standard Proctor (12-inch depth).
- **Remove and replace** with non-woven filter fabric and 3-inch stone capped with CA-06 stone.
  - A layer of non-woven filter geotextile should be placed between silty clay soil and an open-graded stone.
  - The contractor can also attempt to stabilize the existing subgrade in place by “losing” 3-inch stone into the subgrade until the until the voids of the 3-inch stone are filled with the soft soil and the subgrade “locks up,” showing minimal deflection under a proofroll.
- **Geogrid and a stone mat** per manufacturer’s installation specifications could reduce the amount of stone required and provide additional lateral support for foundation loads in service.
- **Lime or other chemical additive** stabilization (12 to 14 inches). This can be done as part of a lift structure. Compaction requirements still apply.

Appendix C – Fill Recommendations

In general, fill materials should meet the following:

- Standard Proctor maximum dry density >100 pcf
- Free of organic or other deleterious materials
- Have a maximum particle size no greater than 3 inches
- Have a liquid limit <45 and plasticity index <25
- Testing should include areas at least 5 feet outside the parking area perimeters, if applicable
- Each lift of compacted, engineered fill should be tested and documented by a representative of the geotechnical engineer prior to placement of subsequent lifts

Suitable Soil Classifications:

CL, SC, GW, and SW will generally be suitable for use as structural fill under pavements.

Unsuitable Soil Classifications:

OL, OH, MH, ML, SM, CH and PT should be considered unsuitable.

- If a fine-grained clay soil is used for fill (CL), close moisture content control will be essential to achieve the recommended degree of compaction
- If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying

Structural fill added to the site shall be evaluated in accordance with the following table:

Material Tested	Proctor Type*-1	Min % Dry Density	Placement Moisture Content Range	Frequency of Testing*-2	Maximum Loose Lift Height
Structural Fill (Cohesive & Well-graded Granular)	Standard	98%	-2 to +3 %	1 per 2,500 yd^2 of fill placed	8 inches
Random Fill (non-load bearing)	Standard	95%	-3 to +3 %	1 per 5,000 yd^2 of fill placed	8 inches
Utility Trench Backfill	Standard	95%	-2 to +2 %	1 per 50 LF of fill placed	6 inches

*-1 The test frequency for the laboratory reference shall be one laboratory Proctor or Relative Density test for each material used on the site. If the borrow or source of fill material changes, a new reference moisture/density test should be performed.

*-2A minimum of one test per lift is recommended unless otherwise specified.

Tested fill materials that do not achieve either the required dry density or moisture content range shall be recorded, the location noted, and reported to the Contractor and Owner. A re-test of that area should be performed after the Contractor performs remedial measures. The above test frequencies should be discussed with the contractor prior to starting the work.

The geotechnical engineer of record can only certify work that was performed under their direct observation, or under the observation of a competent person under their specific direction.

Appendix D – Foundation Construction Recommendations

Rubino recommends that soils at the bottom of the footing design elevation be observed, documented, and tested by a representative of Rubino prior to concrete placement to evaluate the consistency of the soils in the field with the geotechnical report findings. The remedial procedures described in the following paragraph can be used to provide suitable foundation support where unsuitable material such as soft or loose soils, existing fill, or organic soils are encountered.

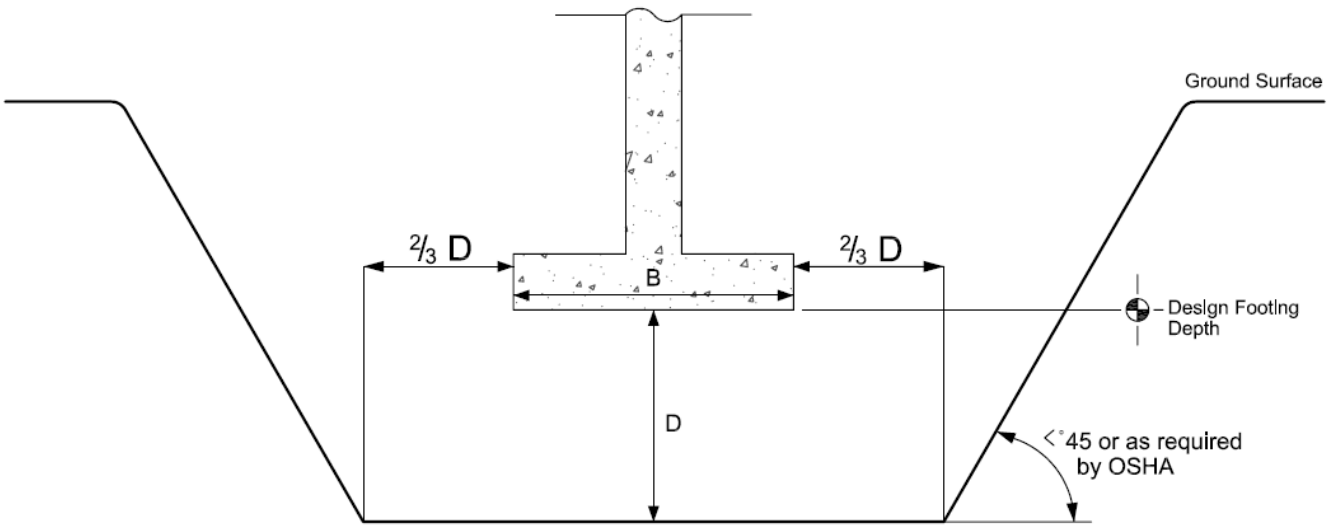
After opening, footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface runoff water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, the soils in the excavation should be protected to reduce evaporation or entry of moisture.

If unsuitable bearing soils are encountered in a footing excavation, the footing should be deepened to competent bearing soil and the footing could be lowered, or an over excavation and backfill procedure could be performed. If an over excavation and backfill procedure will be utilized, it would require widening the deepened excavation in all directions at least 8 inches beyond the edges of the footing for each 12 inches of over excavation depth (See "Over Excavation and Backfill Procedure" diagram below).

The over excavation should then be backfilled in a maximum of 8-inches thick loose lifts with suitable granular fill material, such as ¾ -inch stone with fines (CA-6), compacted to at least 98% of the maximum Standard Proctor dry density (ASTM D 698).

Another alternative is to undercut and refill the unsuitable area with flowable mortar up to the design elevation of the footings. The flowable mortar would serve as a protection to the subgrade during construction of the foundations. In this case, widening the footings is not necessary.

Over Excavation and Backfill Procedure



* Drawing not to scale

Appendix E – Slab-on-Grade Considerations

The subgrade modulus provided in the main report should be adjusted for larger areas of loading using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction, $k_s = (\frac{k}{B})$ for cohesive soil and

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

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

The precautions listed below should be followed for construction of slab-on-grade pads.

- Cracking of slab-on-grade concrete is normal and should be expected.
- Cracking can occur not only as a result of heaving or compression of the supporting soil and/or fill material, but also as a result of concrete curing stresses.
- The occurrence of concrete shrinkage cracks and problems associated with concrete curing may be reduced and/or controlled by:
  - Limiting the slump of the concrete
  - Proper concrete placement, finishing, and curing
  - The placement of crack control joints at frequent intervals, particularly where re-entrance slab corners occur.
    - The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions.
- The floor slab should be independent of the foundation walls.
- Areas supporting slabs should be properly moisture conditioned and compacted. Backfill in all interior and exterior water and sewer line trenches should be carefully compacted to reduce the shear stress in the concrete extending over these areas.
- Exterior slabs should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.
- Rubino recommends that a minimum 4-inch thick, free-draining granular mat be placed beneath the floor slab to enhance drainage. The floor slabs should have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage. Floor slabs should not be rigidly connected to columns, walls, or foundations.
- A vapor retarder should be considered in areas of tile, carpet, or other moisture sensitive floor finishes. Appropriate curing procedures should be followed to reduce the risk of slab “curling” if a vapor retarder is used.

These details will not reduce the amount of movement but are intended to reduce potential damage should some settlement of the supporting subgrade take place. Some increase in moisture content in the floor slab is inevitable as a result of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

Appendix F – Report Limitations

Subsurface Conditions:

The subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data as well as water level information. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition between layers may be gradual. The samples, which were not altered by laboratory testing, will be retained for up to 60 days from the date of this report and then will be discarded.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools that geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free, and more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations, presented in the preceding section, constitute Rubino's professional estimate of the necessary measures for the proposed structure to perform according to the proposed design based on the information generated and reference during this evaluation, and Rubino's experience in working with these conditions.

Warranty:

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

Federal Excavation Regulations:

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

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person," as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Rubino is providing this information solely as a service to our client. Rubino is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

Appendix G – Soil Classification General Notes

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1 3/8" I.D., 2" O.D., unless otherwise noted	PS:	Piston Sample
ST:	Thin-Walled Tube - 3" O.D., Unless otherwise noted	WS:	Wash Sample
PM:	Pressuremeter	HA:	Hand Auger
RB:	Rock Bit	HS:	Hollow Stem Auger
DB:	Diamond Bit - 4", N, B	BS:	Bulk Sample

Standard "N" Penetration: Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split spoon sampler (SS), except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:
Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of ground water levels is not possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION:
Soil Classification is based on the Unified Soil Classification System as defined in ASTM D-2487 and D-2488. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine-grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL); silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE-GRAINED SOILS:

Unconfined Compressive Strength, Qu (tsf)			N-Blows/ft.			Consistency
	<	0.25	< 2			Very Soft
0.25	-	0.5	2	-	4	Soft
0.5	-	1	4	-	8	Medium Stiff
1	-	2	8	-	15	Stiff
2	-	4	15	-	30	Very Stiff
4	-	8	30	-	50	Hard
>	-	8	> 50			Very Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

N-Blows/ft.			Relative Density
0	-	3	Very Loose
4	-	9	Loose
10	-	29	Medium Dense
30	-	49	Dense
50	-	80	Very Dense
		80+	Extremely Dense

RELATIVE PROPORTIONS OF SAND & GRAVEL

Descriptive Term	% of Dry Weight		
Trace		<	15
With	15	-	29
Modifier		>	30

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% of Dry Weight		
Trace		<	5
With	5	-	12
Modifier		>	12

*Descriptive Terms apply to components also present in sample

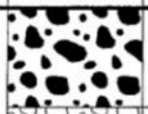
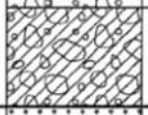
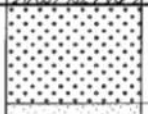
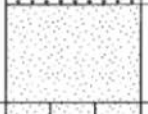
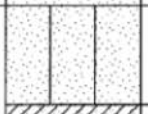
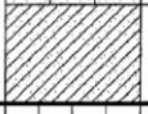
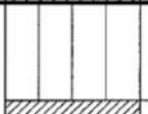
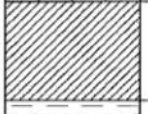
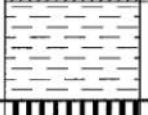
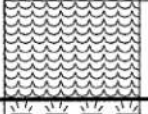
GRAIN SIZE TERMINOLOGY

Major Component	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. To 3 in. (300mm to 75mm)
Gravel	3 in. To #4 sieve (75mm to 4.75mm)
Sand	#4 to #200 sieve (4.75mm to 0.75mm)

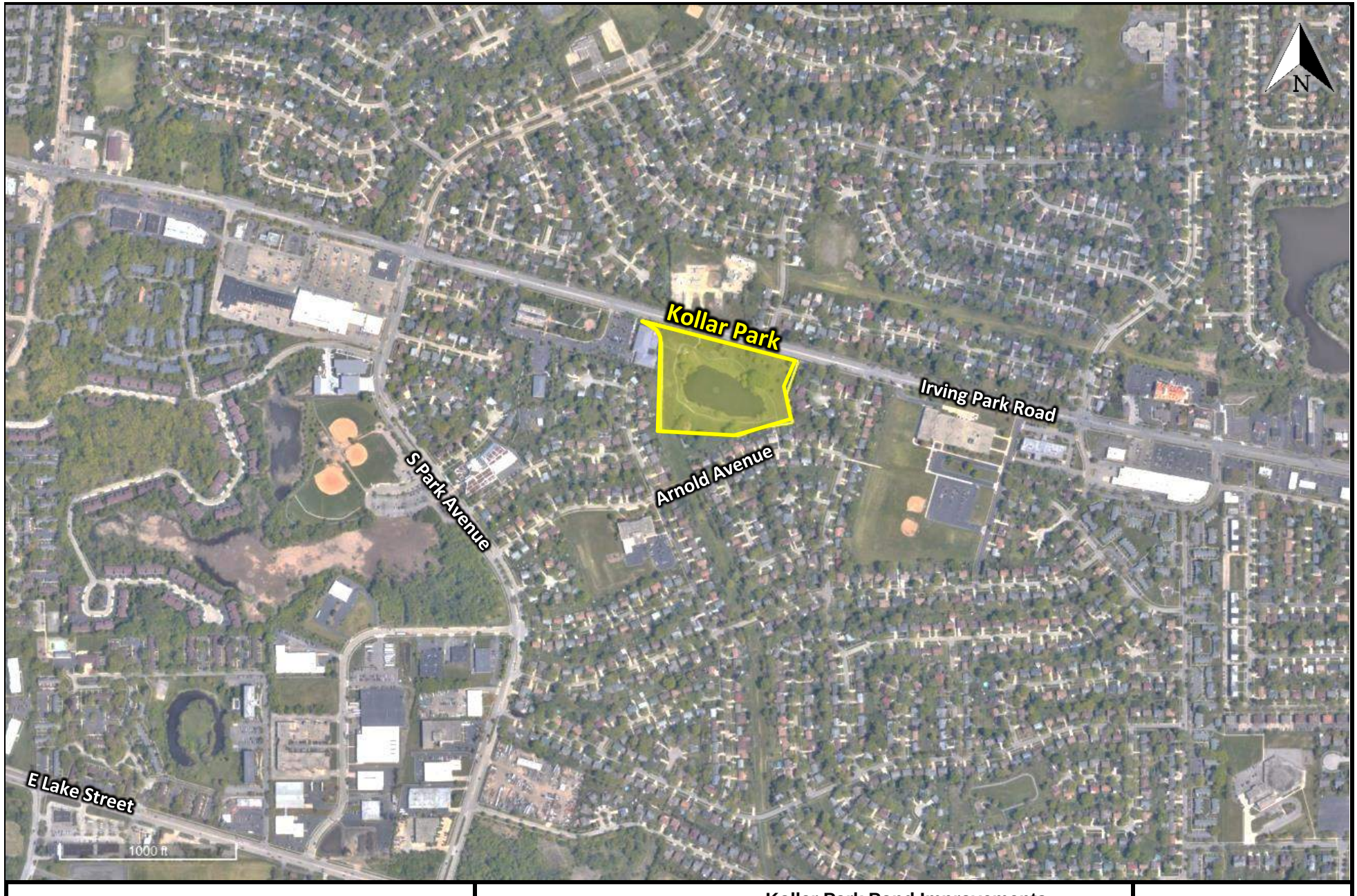
Appendix H – Soil Classification Chart

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

Appendix I – Site Vicinity Map & Boring Location Plan

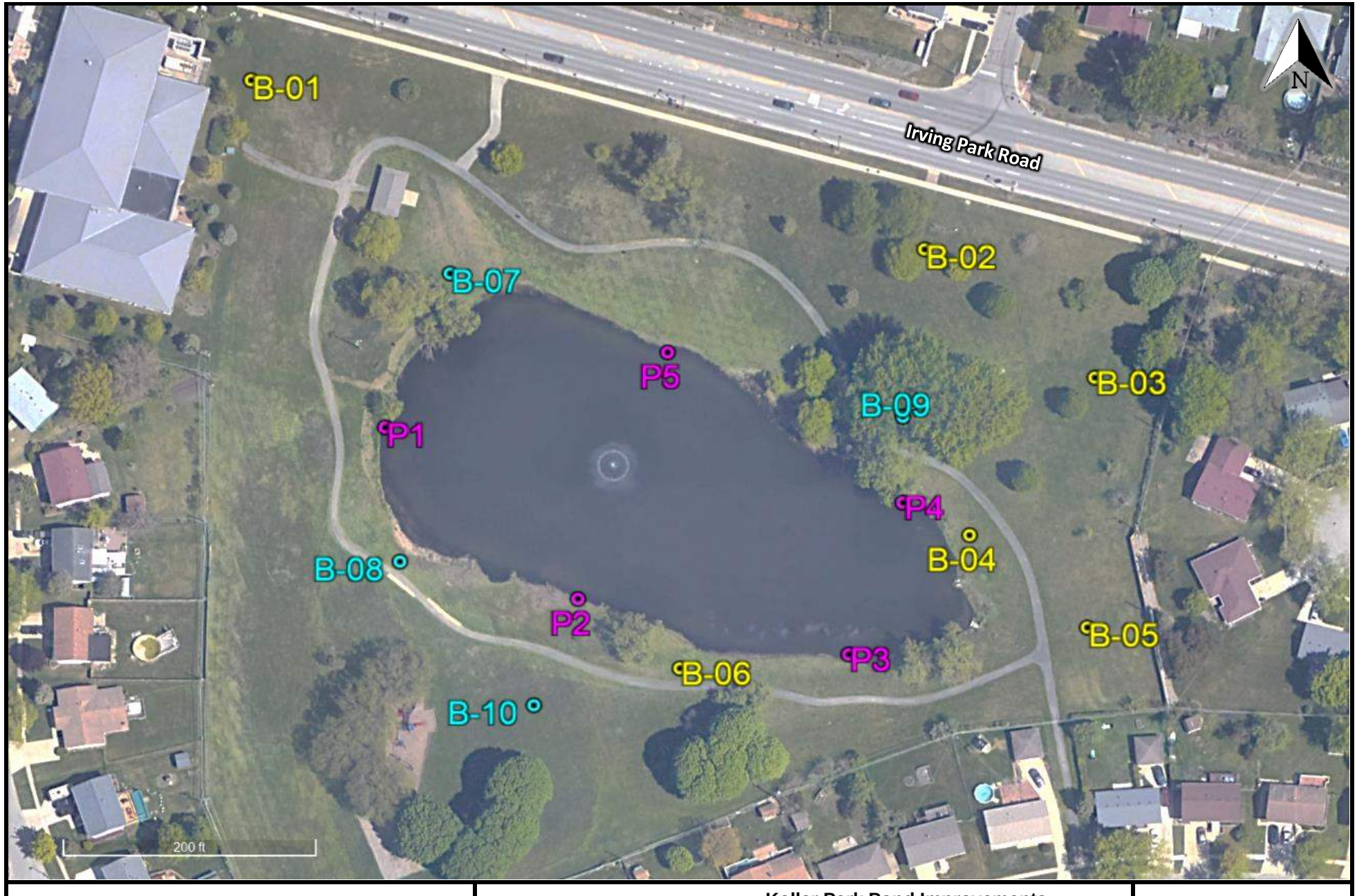


rubino ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name:	**Kollar Park Pond Improvements**
Project Location:	55 E Irving Park Road Streamwood, Illinois
Client:	**Village of Streamwood**
Rubino Project # :	G23.178

Site Vicinity Map



rubino ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name:	**Kollar Park Pond Improvements**
Project Location:	55 E Irving Park Road Streamwood, Illinois
Client:	**Village of Streamwood**
Rubino Project # :	G23.178

Boring Location Plan 1



rubino ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name:	**Kollar Park Pond Improvements**
Project Location:	55 E Irving Park Road Streamwood, Illinois
Client:	**Village of Streamwood**
Rubino Project # :	G23.178

Boring Location Plan 2

Appendix J – Borings Logs

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-01

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Gateway Water Well Plaza	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA / STRENGTH, tsf	Additional Remarks
	0					**Surface Elev.:** 803.45 ft					
						Approximately 6 inches of TOPSOIL: dark brown silty clay, with roots and organic matter					
				1	9	Soft to medium stiff, brown and gray silty CLAY, trace sand and gravel		4-3-3 N=6	24	Qp=2.3 tsf	
800				2	0		CL	2-1-2 N=3	20		
	5										
				3	18	Stiff, brown and gray silty CLAY, trace sand and gravel		4-5-6 N=11	16	Qp=4.5 tsf	
795				4	16	*Color transitions to just gray at approximately 8½ feet below existing grade.*	CL	3-3-5 N=8	17	Qp=3.8 tsf	
	10					End of boring at approximately 10 feet below existing grade.					

Moisture × PL ◪ LL ✚ (0 – 25 – 50)
STRENGTH, tsf: ▲ Qu (Rimac) ✳ Qp/Qr (0 – 2.0 – 4.0)

Completion Depth:	10.0 ft	Latitude:	42.0108250
Date Boring Started:	10/20/23	Longitude:	-88.1707676
Date Boring Completed:	10/20/23	Drill Rig:	Geoprobe 7822DT
Logged By:	P.P.	Remarks:	
Drilling Contractor:	Rubino Engineering, Inc.	Log Entry:	J. Ignarski
		Checked By:	

Sample Types: Auger Cutting; Split-Spoon; Rock Core; Pressuremeter; Shelby Tube; Grab Sample; No Recovery

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-02

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Entry Foyer with Steps / Ramp	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Surface Elev.: 805.06 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA: Moisture (×), PL, LL (0 / 25 / 50); STRENGTH, tsf: Qu (Rimac) (▲), Qp/Qr (✳) (0 / 2.0 / 4.0)	Additional Remarks
	0					Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter					
				1	0	Black ORGANIC SILTY CLAY, trace sand and gravel *No recovery. Soils classified from auger cuttings.*		2-2-2 N=4	33		16% Organic Content
				2	6			2-3-5 N=8	40		17% Organic Content
800	5						OL				
				3	2			2-1-2 N=3	32		12% Organic Content
				4	16	Stiff, brown silty CLAY, trace sand and gravel		2-3-5 N=8			
							CL		21		Qp=2.3 tsf
	10					End of boring at approximately 10 feet below existing grade.					

Completion Depth:	10.0 ft	Sample Types:		Latitude:	42.0104396
Date Boring Started:	10/20/23		Auger Cutting	Longitude:	-88.1688086
Date Boring Completed:	10/20/23		Split-Spoon	Drill Rig:	Geoprobe 7822DT
Logged By:	P.P.		Rock Core	Remarks:	
Drilling Contractor:	Rubino Engineering, Inc.		Pressuremeter	Log Entry:	J. Ignarski
			Shelby Tube	Checked By:	
			Grab Sample		
			No Recovery		

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-03

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Permable Paver Parking Lot	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
	0			**Surface Elev.:** 808.78 ft				
		1	11	Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter Dark brown, black, and gray silty CLAY, trace sand and gravel *Possible Fill*	CL	5-4-8 N=12	23	Qp=4.5 tsf
805		2	12	Dark gray and black silty CLAY, trace sand and gravel *Possible Fill*		3-4-5 N=9	27	Qp=2.3 tsf 6% Organic Content
	5	3	14		CL	3-3-3 N=6	31	Qp=1.5 tsf 5% Organic Content
800		4	6	Medium stiff, brown and gray silty CLAY, trace sand and gravel	CL	1-2-2 N=4	22	Qp=2.3 tsf
	10			End of boring at approximately 10 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture; PL; LL (0, 25, 50)
STRENGTH, tsf
Qu (Rimac); Qp/Qr (0, 2.0, 4.0)

Completion Depth:	10.0 ft	Sample Types:	Pressuremeter; Shelby Tube; Grab Sample; No Recovery; Auger Cutting; Split-Spoon; Rock Core
Date Boring Started:	10/20/23		
Date Boring Completed:	10/20/23		
Logged By:	P.P.		
Drilling Contractor:	Rubino Engineering, Inc.		

Latitude: 42.0101489
Longitude: -88.1683158
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-04

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Pond Extension	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA / STRENGTH, tsf	Additional Remarks
	0					**Surface Elev.:** 802.00 ft					
						Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter					
				1	6	Dark brown and black silty CLAY, trace sand and gravel *Possible Fill* *Trace organic matter observed*	CL	4-5-5 N=10	22		Qp=4.0 tsf
800											
				2	16	Stiff to very stiff, brown and gray silty CLAY, trace sand and gravel		3-4-6 N=10	19		Qp=4.5 tsf
	5										
				3	5		CL	4-6-8 N=14	17		Qp=4.5 tsf
795											
				4	5	*Color transitions to just gray at approximately 8½ feet below existing grade.*		4-6-9 N=15	16		Qp=3.5 tsf
	10					End of boring at approximately 10 feet below existing grade.					

STANDARD PENETRATION TEST DATA: Moisture, PL, LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac), Qp/Qr (0 – 2.0 – 4.0)

Completion Depth:	10.0 ft	Sample Types:	Latitude: 42.0097919
Date Boring Started:	10/20/23	Auger Cutting, Split-Spoon, Rock Core, Pressuremeter, Shelby Tube, Grab Sample, No Recovery	Longitude: -88.1686759
Date Boring Completed:	10/20/23		Drill Rig: Geoprobe 7822DT
Logged By:	P.P.		Remarks:
Drilling Contractor:	Rubino Engineering, Inc.		Log Entry: J. Ignarski
			Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-05

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Southeast Cove	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Surface Elev.: 805.27 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
805	0					Approximately 10 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
				1	13	Dark brown and black silty CLAY, trace sand and gravel *Possible Fill*		4-6-7 N=13	19	Qp=4.5 tsf
				2	14		CL	4-3-3 N=6	17	Qp=4.5 tsf
800	5			3	16	Black and dark gray HIGH PLASTICITY SILTY CLAY, trace sand and gravel *Possible Fill*		1-3-3 N=6	44	Qp=1.0 tsf 6% Organic Content
				4	18		CH	0-2-2 N=4	78	>>Qp=0.5 tsf 8% Organic Content
	10					End of boring at approximately 10 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture; PL; LL
0 25 50
STRENGTH, tsf
Qu (Rimac) Qp/Qr
0 2.0 4.0

Completion Depth:	10.0 ft	Sample Types:	Latitude: 42.0095832
Date Boring Started:	10/20/23	Auger Cutting; Pressuremeter	Longitude: -88.1683359
Date Boring Completed:	10/20/23	Split-Spoon; Shelby Tube	Drill Rig: Geoprobe 7822DT
Logged By:	P.P.	Rock Core; Grab Sample	Remarks:
Drilling Contractor:	Rubino Engineering, Inc.	No Recovery	Log Entry: J. Ignarski
			Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-06

Rubino Job No.:	G23.178
Project:	Kollar Pond Park Improvements
Location:	55 E Irving Park Road
City, State:	Streamwood, Illinois
Client:	Village of Streamwood
Drilling Method:	2 ¼ Hollow Stem Auger
Sampling Method:	Split Spoon
Hammer Type:	Automatic
Boring Location:	Sculpture Knoll Walk

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Surface Elev.: 798.08 ft

Elevation (feet)	Depth (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
	0			Approximately 10 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
		1	12	Dark brown ORGANIC SILTY CLAY, trace sand and gravel *Trace organic matter observed*	OL	1-1-2 N=3	62	>>10% Organic Content
795		2	14	Soft, gray silty CLAY, trace sand and gravel		2-1-2 N=3	20	Qp=1.5 tsf
	5	3	18		CL	0-1-2 N=3	19	Qp=0.3 tsf
790		4	14	Medium stiff, gray SILT, with sand, trace gravel	ML	2-4-6 N=10	10	Qp=2.8 tsf
	10			End of boring at approximately 10 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0, 25, 50)
STRENGTH, tsf
Qu (Rimac), Qp/Qr (0, 2.0, 4.0)

Completion Depth:	10.0 ft
Date Boring Started:	10/20/23
Date Boring Completed:	10/20/23
Logged By:	P.P.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Pressuremeter
Shelby Tube
Grab Sample
No Recovery

Latitude: 42.0094890
Longitude: -88.1695214
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-07

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Performance Pavillion and Amphitheater	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Elevation (feet)	Depth (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
				Surface Elev.: 798.22 ft				
	0			Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
		1	0	Dark gray and black ORGANIC SILTY CLAY, trace sand and gravel *No recovery. Soils classified from auger cuttings.*	OL	0-0-0 N=0	127	>>12% Organic Content
795		2	18	Very soft to soft, gray silty CLAY, trace sand and gravel		0-1-1 N=2	20	Qp=1.0 tsf
	5	3	18		CL	0-1-2 N=3	21	Qp=1.3 tsf
790		4	18	Medium stiff to stiff, gray silty CLAY, trace sand and gravel		2-2-4 N=6	20	Qp=1.0 tsf
	10	5	6			5-5-7 N=12	15	Qp=4.5 tsf
785		6	15		CL	1-3-4 N=7	16	Qp=2.5 tsf
	15							
780		7	16			3-4-7 N=11	16	Qp=3.5 tsf
	20			End of boring at approximately 20 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture; PL; LL (0, 25, 50)
STRENGTH, tsf
Qu (Rimac); Qp/Qr (0, 2.0, 4.0)

Completion Depth:	20.0 ft	Sample Types:	Pressuremeter; Shelby Tube; Auger Cutting; Grab Sample; Split-Spoon; No Recovery; Rock Core
Date Boring Started:	10/20/23		
Date Boring Completed:	10/20/23		
Logged By:	P.P.		
Drilling Contractor:	Rubino Engineering, Inc.		

Latitude: 42.0103876
Longitude: -88.1701923
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-08

Rubino Job No.:	G23.178
Project:	Kollar Pond Park Improvements
Location:	55 E Irving Park Road
City, State:	Streamwood, Illinois
Client:	Village of Streamwood
Drilling Method:	2 ¼ Hollow Stem Auger
Sampling Method:	Split Spoon
Hammer Type:	Automatic
Boring Location:	Wetland Bridge

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Surface Elev.: 798.16 ft

Elevation (feet)	Depth (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
	0			Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
		1	6	Dark gray and black ORGANIC SILTY CLAY, trace sand and gravel	OL	0-0-1 N=1	89	>>10% Organic Content
795		2	14	Soft to medium stiff, gray silty CLAY, trace sand and gravel		0-2-2 N=4	20	Qp=2.3 tsf
	5	3	13			0-2-3 N=5	21	Qp=0.8 tsf
790		4	18			2-1-2 N=3	17	Qp=2.3 tsf
	10	5	17		CL	2-2-2 N=4	17	Qp=2.0 tsf
785		6	18			2-3-4 N=7	14	Qp=3.0 tsf
	15							
780		7	15	Stiff, gray silty CLAY, trace sand and gravel	CL	3-4-7 N=11	17	Qp=2.8 tsf
	20			End of boring at approximately 20 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac) ✳Qp/Qr (0 – 2.0 – 4.0)

Completion Depth:	20.0 ft
Date Boring Started:	10/20/23
Date Boring Completed:	10/20/23
Logged By:	P.P.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Pressuremeter
Shelby Tube
Grab Sample
No Recovery

Latitude: 42.0097316
Longitude: -88.1703382
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-09

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Interpretive Play Grove	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
				Surface Elev.: 800.63 ft				
800	0	1	11	Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter Stiff to very stiff, brown and dark brown silty CLAY, trace sand and gravel		5-6-6 N=12	16	Qp=4.5 tsf
		2	13			6-7-8 N=15	12	Qp=4.5 tsf
795	5	3	16		CL	5-7-8 N=15	12	Qp=4.5 tsf
		4	14	Medium stiff to stiff, brown and gray silty CLAY, trace sand and gravel		5-7-5 N=12	14	Qp=4.0 tsf
790	10	5	16			3-3-4 N=7	14	Qp=3.5 tsf
		6	14	*Color transitions to just gray at approximately 13½ feet below existing grade.*	CL	3-2-3 N=5	15	Qp=2.5 tsf
785	15	7	17			3-3-5 N=8	19	Qp=2.5 tsf
	20			End of boring at approximately 20 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0, 25, 50)
STRENGTH, tsf: Qu (Rimac), Qp/Qr (0, 2.0, 4.0)

Completion Depth:	20.0 ft
Date Boring Started:	10/20/23
Date Boring Completed:	10/20/23
Logged By:	P.P.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Pressuremeter
Shelby Tube
Grab Sample
No Recovery

Latitude: 42.0100610
Longitude: -88.1688707
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-10

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger	WATER LEVELS***	
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon	While Drilling	N/A
Location:	55 E Irving Park Road	Hammer Type:	Automatic	Upon Completion	N/A
City, State:	Streamwood, Illinois	Boring Location:	Pergola Overlook	Delay	N/A
Client:	Village of Streamwood				

Station: N/A
Offset: N/A

Surface Elev.: 802.74 ft

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
	0			Approximately 8 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
		1	11	FILL: brown and dark brown silty clay, trace sand and gravel		3-1-2 N=3	20	Qp=4.0 tsf
800		2	12	Black and dark gray silty CLAY, trace sand and gravel *Possible Fill*		1-2-2 N=4	34	Qp=1.8 tsf 7% Organic Content
	5	3	17			1-1-1 N=2	103	>>Qp=0.3 tsf 8% Organic Content
795		4	12	*Trace organic matter observed at approximately 8½ feet BEG*	CL	0-1-2 N=3	86	>>Qp=0.3 tsf 9% Organic Content
	10	5	14	Soft to medium stiff, gray silty CLAY, trace sand and gravel		0-1-2 N=3	22	Qp=1.0 tsf
790		6	18			2-2-4 N=6	22	Qp=1.3 tsf
	15				CL			
785		7	16	Stiff, gray silty CLAY, trace sand and gravel		3-3-5 N=8	14	Qp=2.0 tsf
	20			End of boring at approximately 20 feet below existing grade.	CL			

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac), Qp/Qr (0 – 2.0 – 4.0)

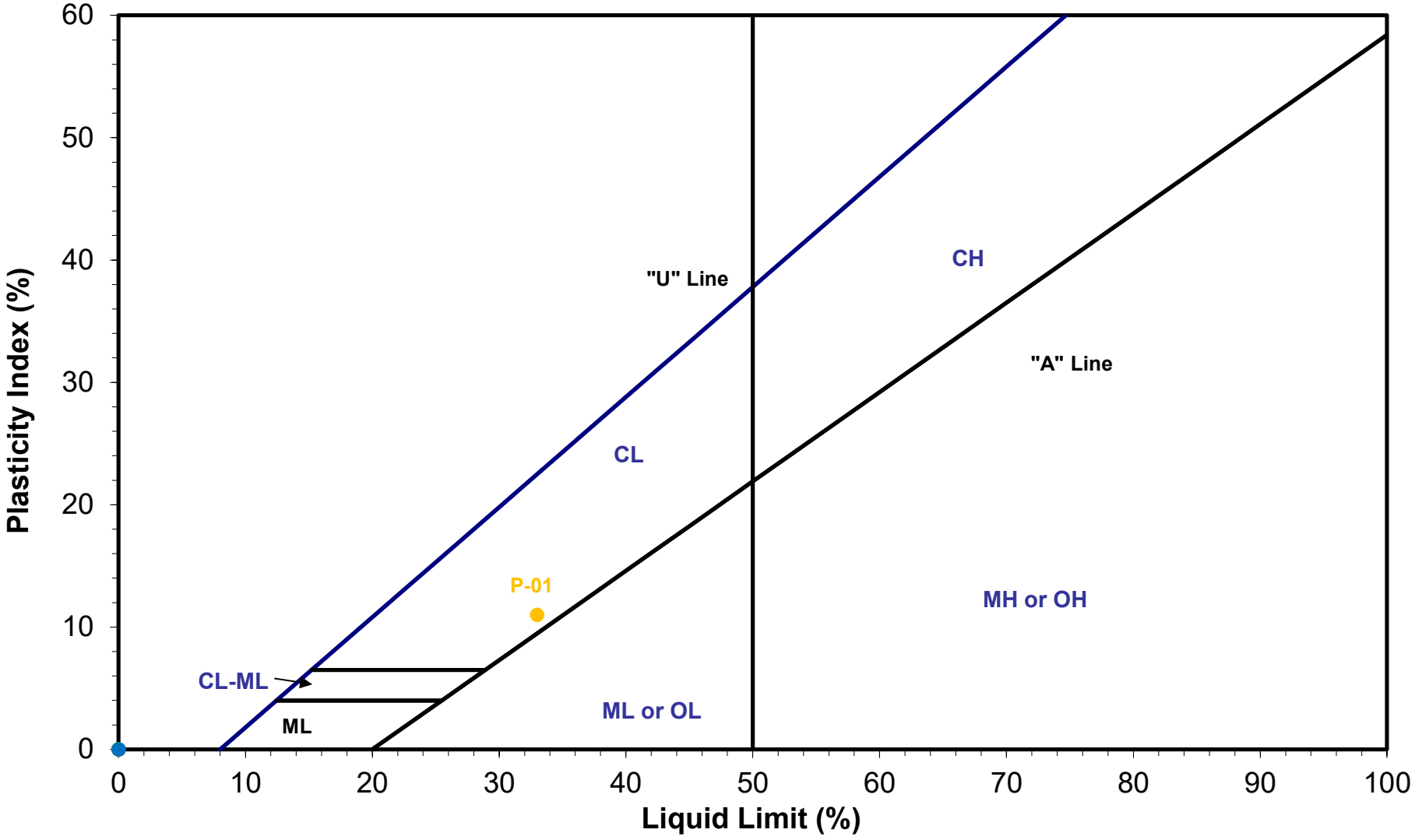
Completion Depth:	20.0 ft	Sample Types:	Latitude: 42.0094055
Date Boring Started:	10/20/23	Auger Cutting, Pressuremeter, Shelby Tube, Split-Spoon, Grab Sample, Rock Core, No Recovery	Longitude: -88.1699459
Date Boring Completed:	10/20/23		Drill Rig: Geoprobe 7822DT
Logged By:	P.P.		Remarks:
Drilling Contractor:	Rubino Engineering, Inc.		Log Entry: J. Ignarski
			Checked By:

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations.

Appendix K – Laboratory Results

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Report of Atterberg Limits Test (ASTM D4318 / AASHTO T89 / AASHTO T90)

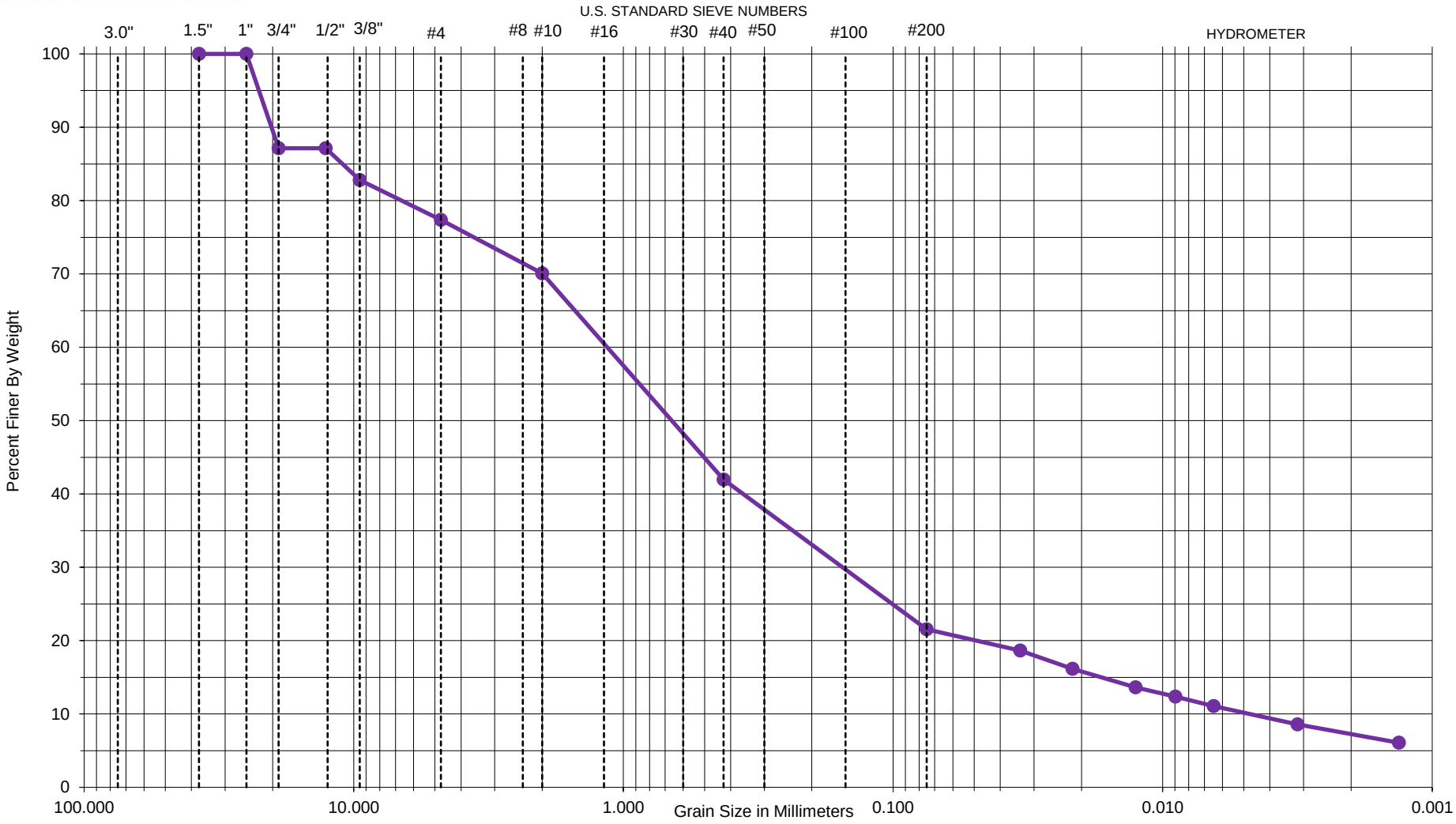


Boring #	P-01					
LL	33					
PL	22					
PI	11					

Project: Proposed Kollar Park Improvements
Location: Streamwood, Illinois
Client: Village of Streamwood
Project #: G23.178

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REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



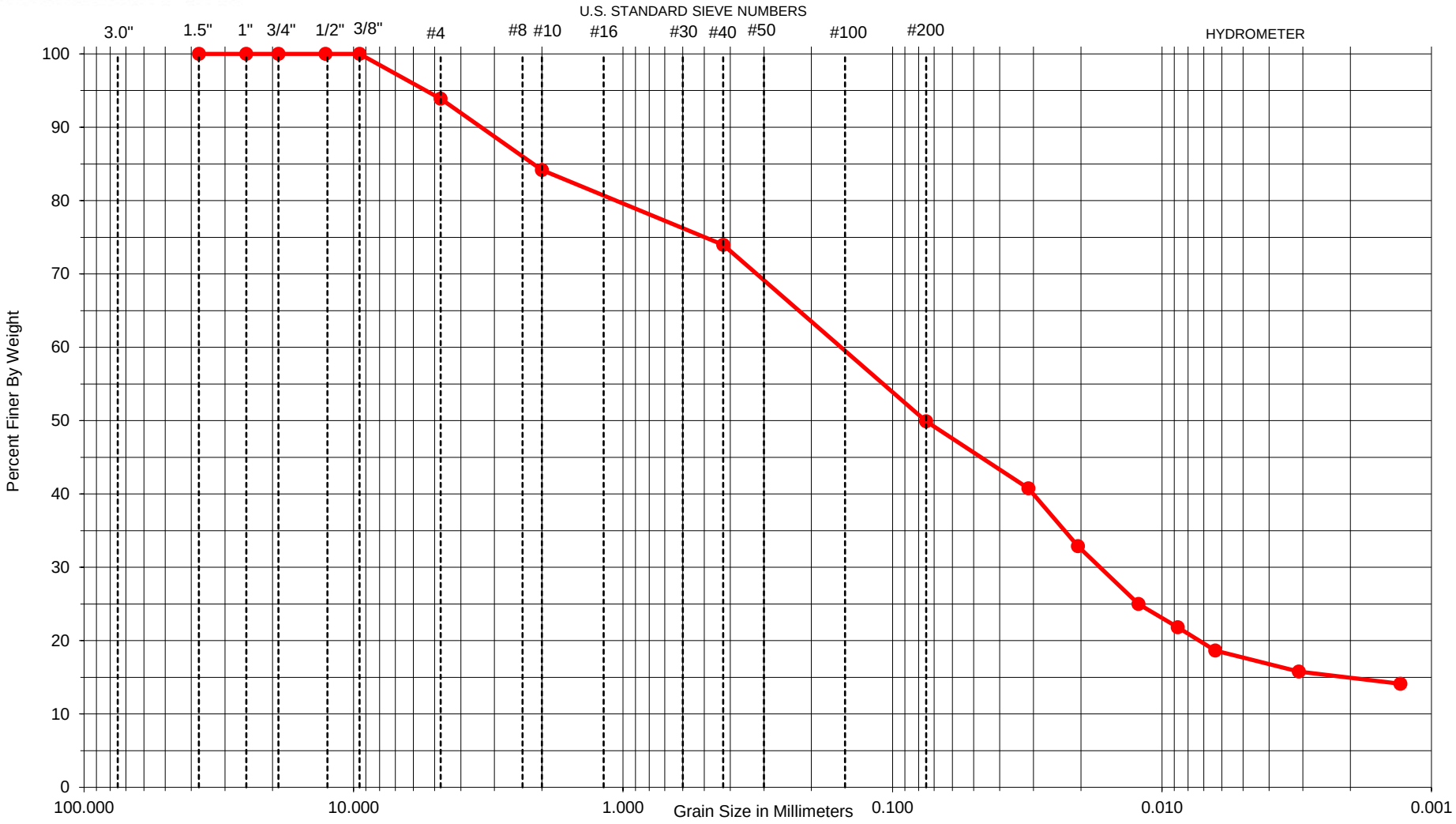
Key	Boring No.	Depth	USCS Classification	WC%	ORG%	Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	P-01B	N/A	ORGANIC SILTY CLAYEY SAND, with gravel	171	12	6.7	285.4	22.6	55.8	14.5	7.0	1.437	0.220	0.005

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL	Kollar Park Improvements, Streamwood, IL	File No. G23.178

Rubino Engineering Inc ● 425 Shepard Drive● Elgin, IL 60123 ● 847-931-1555 ● 847-931-1560 (Fax)

rubino ENGINEERING INC.

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



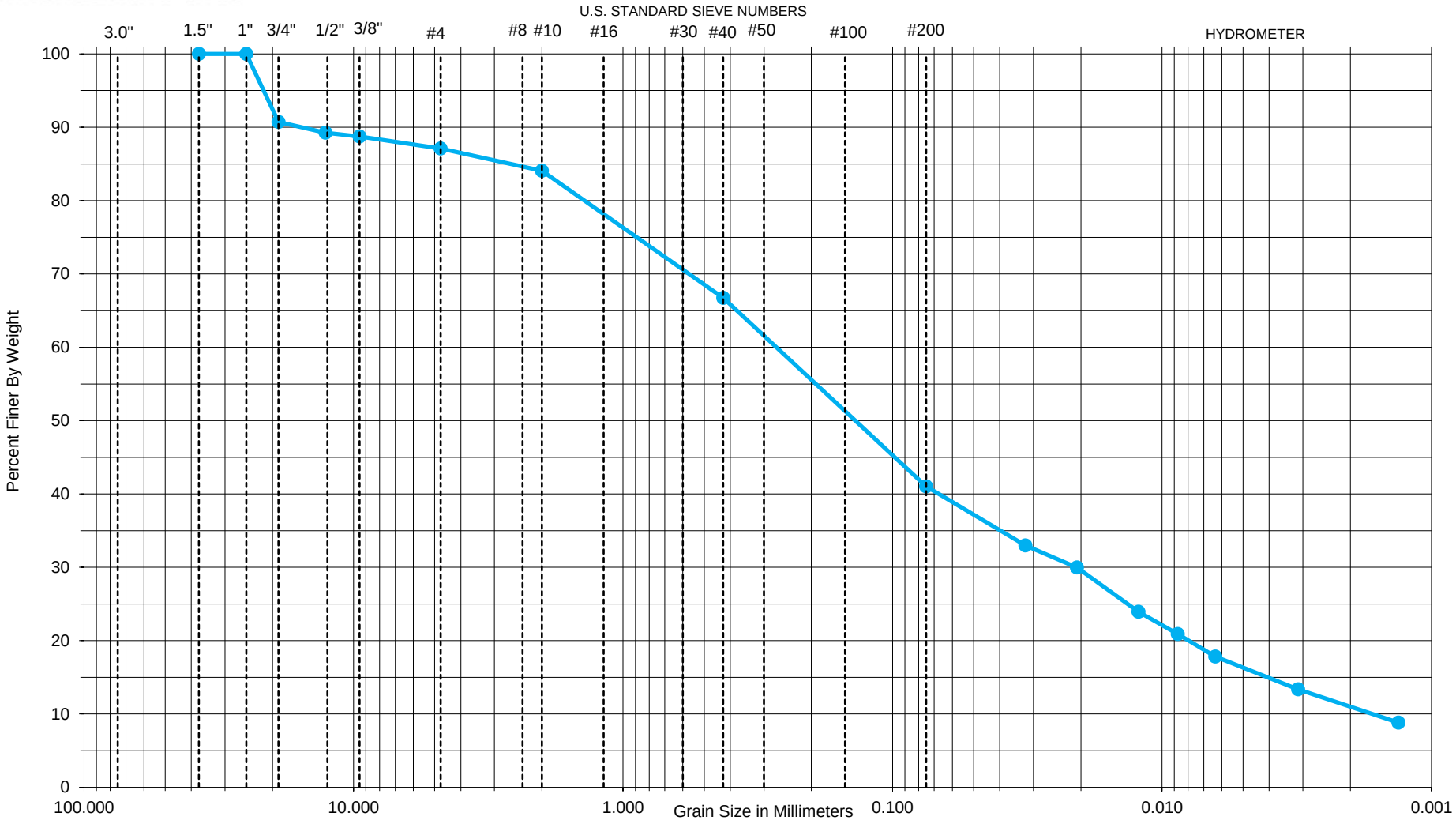
Key	Boring No.	Depth	USCS Classification	WC%	ORG%	Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	P-02	N/A	ORGANIC SILTY CLAYEY SAND	530	65	N/A	N/A	6.12	43.98	35.14	14.76	0.222	0.017	N/A

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL	Kollar Park Improvements, Streamwood, IL	File No. G23.178

Rubino Engineering Inc ● 425 Shepard Drive● Elgin, IL 60123 ● 847-931-1555 ● 847-931-1560 (Fax)

rubino ENGINEERING INC.

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



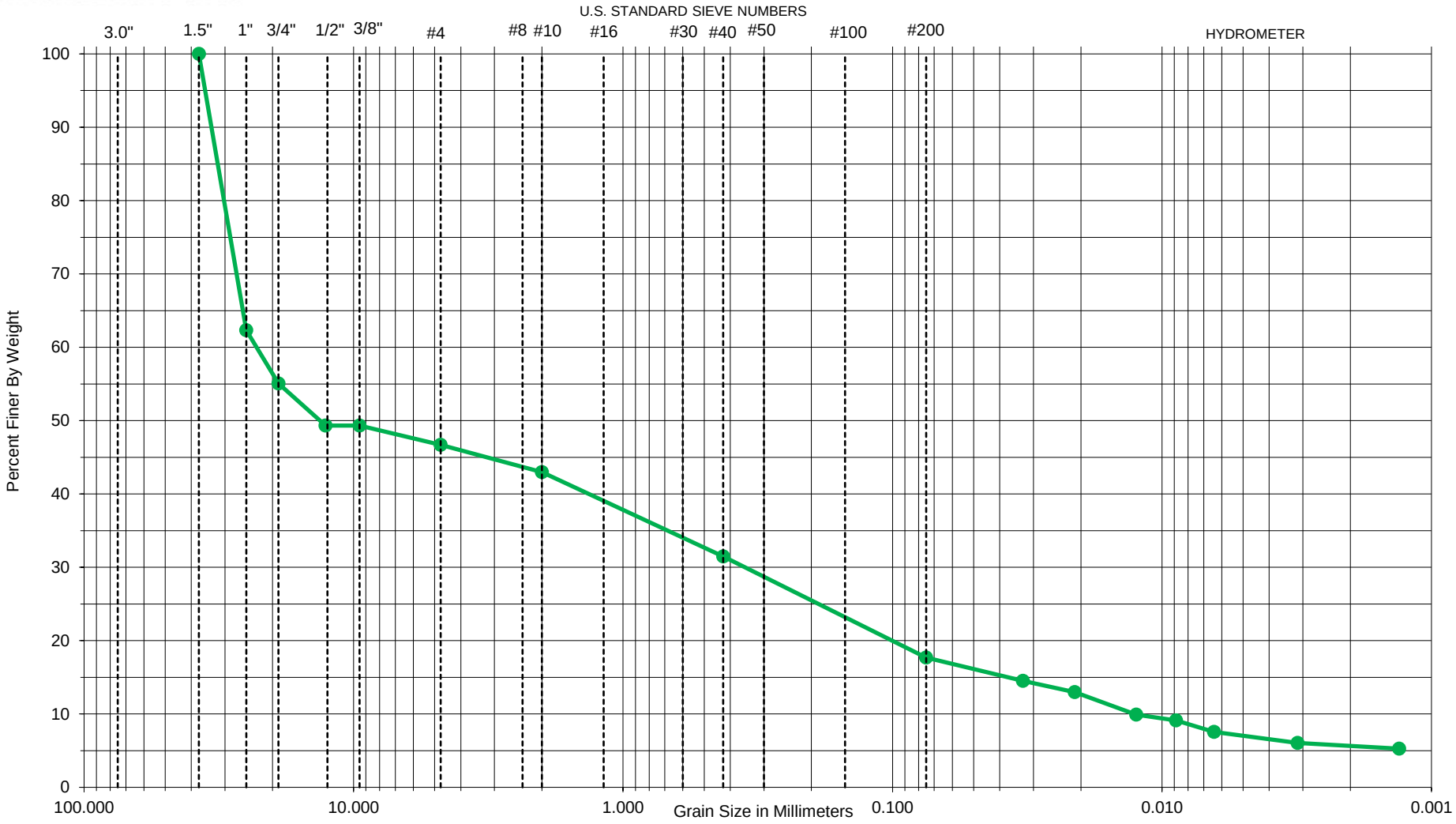
Key	Boring No.	Depth	USCS Classification	WC%	ORG%	Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	P-03B	N/A	ORGANIC SILTY CLAYEY SAND	249	21	0.721	185.7	12.9	46.1	30.5	10.5	0.333	0.021	0.002

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL	Kollar Park Improvements, Streamwood, IL	File No. G23.178

Rubino Engineering Inc ● 425 Shepard Drive● Elgin, IL 60123 ● 847-931-1555 ● 847-931-1560 (Fax)

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REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



Key	Boring No.	Depth	USCS Classification	WC%	ORG%	Cc	Cu	%Gravel	%Sand	%Silt	%Clay	D60	D30	D10
●	P-05B	N/A	Poorly-graded GRAVEL, with silty clay and sand	33	3	0.51	1812	53.3	29.0	12.1	5.6	23.082	0.387	0.013

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL	Kollar Park Improvements, Streamwood, IL	File No. G23.178

Rubino Engineering Inc ● 425 Shepard Drive● Elgin, IL 60123 ● 847-931-1555 ● 847-931-1560 (Fax)

Appendix L – Pond Samples Table

P-01	P-02	P-03
		
USCS CLASSIFICATION: **ORGANIC SILTY CLAYEY SAND**, with gravel Moisture Content: 171% Organic Content: 12%	USCS CLASSIFICATION: **ORGANIC SILTY CLAYEY SAND** Moisture Content: 530% Organic Content: 65%	USCS CLASSIFICATION: **ORGANIC SILTY CLAYEY SAND** Moisture Content: 249% Organic Content: 21%

P-04	P-05
	
VISUAL CLASSIFICATION: **ORGANIC SILTY CLAYEY SAND** Moisture Content: 678% Organic Content: 78%	USCS CLASSIFICATION: **POORLY-GRADED GRAVEL, WITH SILTY CLAY AND SAND** Moisture Content: 33% Organic Content: 3%

rubino ENGINEERING INC.

ADDENDUM LETTER

September 2, 2025

To: Matt Mann, P.E.
Director of Public Works/Village Engineer
Village of Streamwood
565 S. Bartlett Road
Streamwood, Illinois 60107
630-736-3850

Via email: mmann@streamwood.org

Re: **Additional Geotechnical Engineering Services Report Addendum**
Kollar Park Pond Improvements
55 E Irving Park Road
Streamwood, Illinois

Rubino Project No. G23.178_ADD 1

Dear Mr. Mann,

Rubino Engineering, Inc. is submitting this addendum letter in response to the request for additional geotechnical exploration services to provide foundation recommendations for the pavilion canopy and deck, the monument sign, and light pole foundations at Kollar Park in Streamwood, Illinois.

Change Order Authorization

- Rubino Change Order M23.178_Change Order 01 dated July 17, 2025; Signed and authorized by Matt Mann, PE, Director of Public Works/Village on July 23, 2025.

Project Information and Correspondence

- Rubino Engineering, Inc. submitted a geotechnical engineering report for the Kollar Park Improvements project under Rubino project number G23.178 dated December 4, 2023 after the Village reviewed and requested draft watermark be removed and report finalized.
- Various email correspondence with Devon Dillinger of Confluence, Boris Galindo of GFT, and Chandani Bhagat of Primera Engineers between June 18, 2025 and July 7, 2025 discussing the requests and providing updated information for additional foundation design recommendations for the pavilion, deck, catenary lighting, and monument sign in the vicinity of existing borings B-01 and B-07.
- Virtual teams meeting between Confluence, GFT, Primera, and Rubino discussion on additional scope on June 26, 2025
- Documents provided by Devon Dillinger of Confluence on June 26, 2025
  - “Kollar Pond - 80% CD Revew Set” – plan set
  - “Kollar Pond - 50% DD Electrical Drawing” – proposed light pole boring locations
- Canopy and Deck Maximum Reactions provided by Boris Galindo of GFT via email on July 2, 2025.
- Proposed ground elevation and bearing depth for proposed monument sign provided by Primera Engineers and Confluence on July 24, 2025.
- Updated plan set (Kollar Pond - 80% CD Architecture) and existing / proposed elevations at borings LPB-01, LPB-02, and LPB-03 provided via email by Confluence on August 21, 2025.
- Estimated weight of the proposed monument sign provided via email by Confluence on August 26, 2025.
- Existing Elevation at boring B-07A provided by Confluence on September 2, 2025

Purpose / Scope of Services – Addendum

The purpose of this study was to explore the subsurface conditions at the site to prepare additional geotechnical recommendations for foundation design and seismic design for the proposed construction. Rubino's additional scope of services included the following drilling program:

Table 1a: Additional Drilling Scope

NUMBER OF BORINGS	DEPTH (FEET BEG*)	LOCATION
3	15	LPB-01 through LPB-02 (Proposed Light Poles)
1 (Extension)	Blind drill to 15 ft, Extend to 50 ft	B-07A (Proposed Performance Pavilion / Amphitheater Canopy and Deck)

*BEG = below existing grade

Representative soil samples obtained during the field exploration program were transported to the laboratory for additional classification and laboratory testing.

This addendum report briefly outlines the following:

- *Summary of additional client-provided project information and report basis*
- *Overview of additional encountered subsurface conditions*
- *Overview of additional field and laboratory tests performed, including results*
- *Geotechnical recommendations pertaining to:*
  - *Intermediate or Deep foundations bearing at or above 40 feet below existing grade for the proposed Performance Pavilion / Amphitheater Canopy and Deck*
  - *Light pole foundations, including shear strength estimates in each boring*
  - *Shallow foundation recommendations for a monument sign in the area of Boring B-01 based on site grading in this area being less than 1 foot cut or fill*
  - *Seismic Site Classification*

Subsurface Conditions – Additional Exploration

Beneath the existing topsoil, subsurface conditions in this additional exploration generally consisted of cohesive undocumented fill soils, brown, black, and/or gray organic silty clay, and gray silty clay.

- The **topsoil** thicknesses, visually observed at the additional boring locations (LPB-01, LPB-02, and LPB-03) ranged between approximately 10 and 12 inches
- The **undocumented fill** soils in the additional borings (LPB-01, LPB-02, and LPB-03) were generally cohesive in nature
- Organic silty clay soil with high moisture contents encountered within some of the borings.
- The native **silty clay** soils ranged from very soft to very stiff in consistency

Table 2a: Subsurface Conditions Summary – Addendum

Approximate Elevation Range, feet (Depth Range, feet BEG*)	Soil Description	SPT N-values (blows per foot)	Moisture Content (%)
LPB-01 through LPB-03 Proposed Light Poles			
803 ½ – 796 ½ (1 – 6 ½)	FILL: brown/dark brown/black silty clay, trace sand and gravel *(LPB-01 & LPB-03)*	4 – 9	22 – 37
799 ½ – 791 ½ (1 – 8 ½)	Black, brown, and/or dark gray ORGANIC SILTY CLAY *(LPB-01 & LPB-02)*	0 – 5	57 – 190
796 ½ – 789 (3 ½ – 11)	Very soft to soft, gray silty CLAY, trace sand and gravel *(LPB-01 & LPB-02)*	0 – 3	25 – 32
794 ¼ – 785 (6 – 15)	Medium stiff to stiff, gray silty CLAY, trace sand and gravel	4 – 12	13 – 23
B-07 / B-07A Performance Pavilion / Amphitheater Canopy and Deck			
797 – 794 ¾ (1 – 3 ½)	Dark gray and black ORGANIC SILTY CLAY, trace sand and gravel	0	127
794 ¾ – 789 ¾ (3 ½ - 8 ½)	Very soft to soft, gray silty CLAY, trace sand and gravel	2 – 3	20 – 21
789 ¾ – 779 (8 ½ – 18 ½)	Medium stiff to stiff, gray silty CLAY, trace sand and gravel	6 – 15	15 – 20
779 – 747 ½ (18 ½ – 50)	Stiff to very stiff, gray silty CLAY, trace sand and gravel	9 – 24	16 – 22

*BEG = below existing grade

The native soils were visually classified as silty clay (CL) and organic silty clay (OL) according to the Unified Soil Classification System (USCS). The above table is a general summary of subsurface conditions. Please refer to the boring logs for more detailed information.

Estimated shear strength of clay soils is based on empirical correlations using N-values, moisture content, and unconfined compressive strength.

Organic Soils Discussion – LPB-01 through LPB-03

Organic soils greater than 10% loss on ignition were observed within some of the additional borings (LPB-01 and LPB-02) during the drilling operations; there is a possibility that organic soils could be encountered at other locations on the site.

Organic soils can later cause settlement or stability problems. If encountered during construction, Rubino recommends that organic soils be removed and replaced with a compacted and documented engineered fill.

Organic soils are defined as soils containing visible organic matter or greater than 10% organic matter as measured in a laboratory loss on ignition test. Organic soils typically consist of decomposed plant material accumulated under conditions of excessive moisture. Organic soils are dark colored in nature and may exhibit the odor of decaying vegetation.

Table 3a: Organic Content by Location – Addendum

BORING NUMBER	APPROXIMATE ELEVATION RANGE, FEET (DEPTH RANGE, FEET BEG*)	ORGANIC LOSS ON IGNITION LOI%
LPB-01	796 ½ – 791 ½ (3 ½ – 8 ½)	25% – 28%
LPB-02	799 ½ – 796 ½ (½– 3 ½)	25%
B-07	See *Organic Soils Discussion* in Rubino Report G23.178 dated December 4, 2023	

*BEG = below existing grade

Undocumented Fill Discussion – LPB-01 through LPB-03

Undocumented fill was observed in the additional borings LPB-01 and LPB-03 to depths of about 3 ½ to 6 ½ feet below existing grade.

Where existing fill is encountered, Rubino recommends that structure foundations extend through the fill materials and be supported on suitable soils, intermediate foundations, cured flowable fill, or compacted and documented structural fill. See the foundation recommendations section for more details.

Undocumented fill is defined as fill that has been placed without being documented as to its placed density and moisture content.

Deleterious materials could include, but are not limited to, bricks, asphalt, concrete, metal, wood, or other building debris.

Deleterious materials were not observed within the undocumented fill materials during the drilling operations for the above referenced borings. Although deleterious materials were not encountered in the undocumented fill materials, this does not eliminate the possibility that deleterious materials could be present within the undocumented fill materials at other locations along the project.

If encountered during construction, fill with deleterious materials should be removed and replaced with structural fill at the geotechnical field engineer's discretion at the time of construction.

Topsoil Discussion – LPB-01 thru LPB-03

Topsoil materials as described in this report have not been analyzed for quality according to any minimum specifications. If topsoil is to be imported to or exported from this site, Rubino recommends that it meet the minimum specifications defined in **Section 1081.05** of the *IDOT Standard Specifications for Road and Bridge Construction*, adopted by the Illinois Department of Transportation, January 1st, 2022.

Rubino has reported topsoil thicknesses at each of the additional boring locations (LPB-01, LPB-02, and LPB-03) based on visual observation of surficial soils. Surficial topsoil thickness was visually observed to be between approximately 10 and 12 inches.

Site Preparation – Additional Exploration

The following comments are considered site-specific and should be considered in addition to the *Site Preparation* section of Rubino report G23.178 dated December 4, 2023. To reference general subgrade preparation recommendations and compaction recommendations, please refer to the Appendix of the original Rubino report, G23.178 dated December 4, 2023.

- Prior to placing fill, organic soils should be removed and subgrade soils should be documented by subgrade stability testing as recommended in the Appendix to Rubino report G23.178 dated December 4, 2023.
- Subgrade soils will likely need to be stabilized / remediated during mass grading and prior to placing structural fill and structural elements. Rubino recommends including a nominal quantity for undercuts in addition to where organic soils are encountered and removed and in structural areas where low-strength soils are encountered.
- After the subgrade has been tested, documented, and remediated as recommended, fill placement required to establish grades may begin as applicable. The new fill materials should be placed and compacted per *Appendix C* of Rubino report G23.178 dated December 4, 2023.
- A maximum of approximately 7 feet of structural fill placement is expected to achieve final grades in the area of the proposed pavilion canopy / deck structure. This fill estimate is based on the existing and the proposed elevations at boring locations B-07/B-07A using the documents provided at the time this report was prepared.
    - Rubino recommends that settlement monitoring points be placed to monitor settlement over time. After the primary settlement has taken place, foundations for the structures can be constructed.

Foundation Recommendations for Proposed Monument Sign (B-01 & LPB-03)

The proposed monument sign structure can be supported on shallow, spread footing foundations after undercuts are performed and backfilled with properly compacted and tested structural fill. Please see the *Fill Recommendations* and *Foundation Construction Recommendations* Appendices in Rubino report G23.178 dated December 4, 2023 for more details.

Undercuts have been estimated based on existing elevations at borings B-01 and LPB-03, the proposed elevation at the proposed monument sign, and the proposed footing width of the

foundation sign provided to Rubino by Confluence and Primera Engineers via email and planset. The following bullets provide the basis for the bearing capacity recommendations provided in *Table 4a*.

- Proposed grade elevation: 805 ½ feet
- Proposed foundation bearing elevation: 801 ½ feet
- Foundation width: 6 feet

Rubino recommends the foundations bear on suitable bearing soils to achieve the specified bearing capacities (reference boring logs for suitable bearing soil classification at each location):

Table 4a: Monument Sign Bearing Capacity Recommendations

Boring Number	Proposed Grade Elevation (feet)	Boring Surface Elevation (feet)	Estimated Footing Design Bearing Elevation (feet)	Approximate Elevation of Suitable Bearing Soils (feet)	Max Net Allowable Bearing Capacity (psf)
B-01 & LPB-03	805 ½	804 ½ – 803 ½	801 ½	798 – 797 ½	2,500

Foundation excavations should be widened in accordance with *Appendix D* of Rubino report G23.178 dated December 4, 2023, unless lean concrete is utilized as backfill for the undercuts.

Rubino recommends that undercuts extend through undocumented fill soils, low strength soils, topsoil, and organic soils as determined by the geotechnical engineer at the time of construction.

Design / Construction – Frost Protection

Exterior footings should be located at a depth of at least 3 ½ feet below the outside final exterior grades to provide adequate frost protection. If the structure is constructed during winter months or if the footings will likely be subjected to freezing temperatures after construction is completed, then the footings should be protected from freezing.

Design – Settlement Estimate

Based on the known subsurface conditions, laboratory testing, and past experience, Rubino anticipates that properly designed and constructed footings supported on the recommended, observed and documented natural soils, or properly compacted structural fill should experience maximum total settlement of 1 inch.

Light Pole Foundation Recommendations (LPB-01 to LPB-03 & B-07)

Design – Estimate Soil Shear Strengths

The proposed lights are anticipated to be supported by drilled shaft foundations. Rubino understands that the foundations will extend to a minimum of 8'-6" below proposed finished grade and have a diameter of 30 inches. Drilled shaft foundations may need to be extended in areas of fill or unsuitable soils.

Unconfined compressive strength estimates based on the encountered soils can be found below:

Table 5a: Light Pole Foundation Bearing Capacity Recommendations

DESCRIPTION		LIGHT POLE GEOTECHNICAL RECOMMENDATIONS
Anticipated Foundation Type:		Drilled Shaft Foundation
Proposed Diameter (per Kollar Pond 80% CD Review Set):		30 inches
Existing Ground Elevation at each boring location (provided by Confluence)		LPB-01: 799.9 feet LPB-02: 800.3 feet LPB-03: 804.4 feet B-07: 798 feet
Proposed Bearing Elevation (per Kollar Pond 80% CD Review Set):		8 ft-6 in below proposed ground elevation
Silty Clay Estimated Unconfined Compressive Strength within the borings at depths below existing grade:		
LPB-01:	8 ½ ft – 11 feet BEG*	0 – 0.5 tsf
	11 – 13 ½ feet BEG*	1.0 – 1.25 tsf
	13 ½ – 15 feet BEG*	1.75 – 2.0 tsf
LPB-02:	3 ½ – 8 ½ feet BEG*	0.5 – 0.75 tsf
	8 ½ – 15 feet BEG*	1.75 – 2.0 tsf
LPB-03:	0 – 6 ½ feet BEG*	1.0 – 1.25 tsf
	6 – 8 ½ feet BEG*	1.0 – 1.25 tsf
	8 ½ – 15 feet BEG*	1.75 – 2.0 tsf
B-07:	3 ½ – 8 ½ feet BEG*	0.5 – 1.0 tsf
	8 ½ – 11 feet BEG*	0.75 – 1.0 tsf
	11 – 20 feet BEG*	1.75 – 2.0 tsf

*BEG = below existing grade

The top 4 feet of shaft length should not be included in the allowable skin friction due to frost action.

Foundation Options for Proposed Pavilion Canopy and Deck (B-07 / B-07A)

Rubino understands a pavilion canopy and deck structure are proposed as part of the park improvements. Boris Galindo of GFT provided the following design information for the proposed pavilion canopy and deck:

- Canopy Maximum Reactions:
  - Moment: 200 kip*ft, Shear: 32-kip, Torsion: 60-kip, Axial: 90-kip
- Deck Maximum Reactions:
  - Axial: 100 kip

Based on the subsurface conditions encountered in boring B-07/B-07A, Rubino is providing the following geotechnical recommendations for foundations options at the proposed pavilion canopy and deck structures.

- Shallow Foundations bearing on Stone Columns
- Intermediate Foundations bearing on helical piers
- Deep foundations – Drilled Shafts

Shallow Foundation Option supported by Stone Columns

The proposed pavilion canopy and deck can be supported on shallow, spread footing foundations that are supported by a **stone column system to be designed and installed by a specialty contractor**.

Maximum net allowable soil bearing pressure may be on the order of **3,000 psf** depending on the final design by the specialty contractor.

Stone Column Features:

- Stone Columns are considered an intermediate ground improvement system
- They create a very dense, stiff, rock pier that expands the drilled shaft and reinforces the subgrade soil.
- Shallow foundations can be constructed on top of the piers.
- Can be constructed in shallow groundwater conditions
- Some systems generate no spoils

Stone Column Considerations:

- Generate vibrations that could affect adjacent structures.
- Require special equipment to construct the piers.
- Require proprietary design by a specialty contractor

Intermediate Foundation Option - Helical Piers

Helical piers are an intermediate foundation option that can be designed and incorporated into a pile cap for support of the structure.

There are many possibilities for helical pier design. The spacing of the helical on the shaft and the diameter helical should be selected based on the requirements of the foundation reinforcement as a result of the loading. The helical pier installer or manufacturer should be consulted to perform the design of the helical piers for each specific location on site.

The connections between the helical piers and the foundations should be designed by the structural engineer and the load transfer characteristics of the existing foundations should be considered in selecting the helical pier spacings.

Helical pier design and installation should be performed by qualified personnel. Rubino recommends that helical pier installation be observed and documented by a representative of Rubino to evaluate the consistency of the soils in the field with the geotechnical report findings.

Deep Foundation Option – Drilled Shaft

Based on the subsurface conditions encountered in boring B-07/B-07A, deep foundations are also an option for the proposed pavilion canopy and deck structures. This report is based on the organic soil being removed as part of the mass grading operations of this project.

Table 6a below includes parameters for deep foundation design. The allowable end bearing values include a factor of safety of 3 and the allowable skin friction values include a factor of safety of 2. Lateral parameters have been included for use in discrete element analysis software such as LPILE or COM624P.

Table 6a: Pavillion Canopy / Deck Soil Parameters (B-07 and B-07A)

Soil Type	Approximate Elevation Range (feet)	Estimated Unit Weight (pcf)	Allowable End Bearing (psf)	Estimated Shear Strength (psf)	Allowable Skin Friction** (psf)	Static Lateral Modulus (pci)	Strain Factor, E_{50}
Structural Fill	802 – 794 ½*	125	n/a	n/a	n/a	n/a	n/a
Very soft to soft, Silty CLAY	794 ½ – 789 ½	110	1,000	350	100	30	0.02
Medium stiff, silty CLAY	789 ½ – 787	115 – 120	2,000	900	225	200	0.0085
Medium stiff to stiff, silty CLAY	787 – 782	120 – 125	3,000	1,250	275	750	0.0075
Stiff to very stiff, silty CLAY	782 – 750	125 – 130	4,500	1,700	400	600	0.0065

*Upper 5 feet of the shaft should be ignored in the development of skin friction.
**The skin friction should be ignored one shaft diameter above the bearing depth

Deep Foundation Settlement Estimate

Based on a maximum axial load range of 90 – 100 kips per drilled pier bearing on native stiff silty clay or better, and the results of field investigation, total settlement per pier is expected to be less than 1 inch.

General Design Considerations – Drilled Piers

- The overall structural stresses under the design load occurring in the installed pier shaft should be equal to or less than those allowed by local codes or as specified herein.
- This report does not include structural design for the deep foundation elements.
- Uplift capacity requirements were not available at the time this report was prepared. Please see ***Uplift Capacity*** section below for more information.

Pier Groups

If grouped piers are considered for the foundations, the capacity of the pile group can be taken as the sum of the capacities of the individual piles multiplied by the efficiency of the group.

Ideally, the piles should be placed so that the areas of influence of adjacent piles do not interact, thus allowing an efficiency of 100% to be used in the design. In general, a center-to-center pile spacing of 3 times the pile diameter is sufficient to allow for 100% efficiency.

The ultimate capacity of a grouped pile system depends on the size of the piles used, the configuration of the piles in the group, and the spacing of the piles.

Deep foundations that are not bearing on a very stiff stratum such as rock shall be at least 3 diameters apart from each other or **group reduction factors** will need to be employed in the design capacity of these members.

The installation of piers shall not be performed within a distance equal to 8 diameters of pier elements that have been installed fewer than 24-hours previously.

Lateral Load Analysis

The lateral capacity is directly linked to the strain characteristics of the foundation element. The lateral loads on the piers can be calculated with the parameters provided in *Table 6a* above. These parameters are for analytical programs such as L-Pile or COM624P which will analyze both the applied load verse strain resistance of the soil and the deflection of the structural element. The parameters given are ultimate values and a factor of safety of 2.0 should be applied to these values to evaluate the allowable limits. In general, the upper 5-feet below grade of the pier is ignored in the lateral capacity for exterior piles and for areas exposed to footings.

Uplift Capacity

The uplift capacity for the deep foundations is equal to the allowable skin friction and the weight of the pier. The effective weight of the pier concrete (at 145 pcf) should be included in the uplift calculations. If uplift is a concern at this site, please notify the geotechnical engineer prior to finalizing structural design.

Pile Load Test

The drilled pier capacities recommended in this report are based on empirical methods using a factor of safety. Actual capacities can be measured by performing a pile load test. Pile load testing can reduce the factor of safety used in design.

If desired by the client, the load test should be performed in general accordance with the "Standard Method of Testing Piles under Axial Compressive Load," (ASTM D1143) prior to constructing the remaining pier foundations.

Procedures required for constructing the test pier should be observed to establish desirable procedures for constructing the remaining piers. The test pier concrete should be at least 14-days old at the start of the load test with a 7-day break of a test cylinder of at least 80 % of the ultimate design strength. Accurate records of the piers' installations shall be obtained during construction.

Construction Considerations – Drilled Piers

Sequencing

- The sequence of operations should be scheduled so that each pier is drilled, reinforcing steel is placed, and concrete is placed in a continuous, rapid, and orderly manner to reduce the time the excavation is open.
- To facilitate pier construction, concrete should be on site and ready for placement as the pier excavation is completed.
- The foundation excavation should be cleaned of loose or disturbed materials and any free water before placing reinforcing steel and concrete.
- Precautions should be taken to permit the pier to be drilled and installed under relatively dry conditions. Pumping of the pier excavations may be required prior to the installation of the concrete.

Concrete Considerations

- To reduce the lateral movement of the pier, the contractor must **fill voids or enlargements** in the pier shaft excavation with concrete at the time of concrete placement.
- If **drilling fluid** is used or there is an inflow of water into the excavation, drilled pier concrete should be placed by tremie methods.
- **Concrete slumps** ranging from 4 to 7-inches are recommended for drilled pier construction. Concrete with slumps in this range will usually fill irregularities along the side and bottom of the hole. The concrete slump for tremie methods should be 7 to 9 inches.
- Concrete should be placed into the drilled hole through a **centering chute** at the surface to prevent contact with the sides of the hole and reinforcing steel. This procedure will reduce the potential side flow and segregation.

Seismic Site Classification – Pavillon Canopy/Deck

The 2015 International Building Code requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and strata types). Based on the estimated depth to rock, the estimated shear strength of the soil at the boring location (B-07/B-07A), and the recommended removal of organic soils from the site, Site Class "D" is recommended.

This site class is recommended based on Rubino's opinion and experience in the area that the consistency of the soils below the depth explored remain consistent or improve in density. Actual determination of soil properties to a depth of 100 feet was beyond the scope of this project.

The SEAOC/OSHPD probabilistic ground motion values near latitude 42.0103876° and longitude –88.1701923° are shown in the table to the right.

Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	D

Type	Value	Description
S_S	0.145	MCE_R ground motion. (for 0.2 second period)
S_1	0.062	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.231	Site-modified spectral acceleration value
S_{M1}	0.149	Site-modified spectral acceleration value
S_{DS}	0.154	Numeric seismic design value at 0.2 second SA
S_{D1}	0.099	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.076	MCE_G peak ground acceleration

Closing

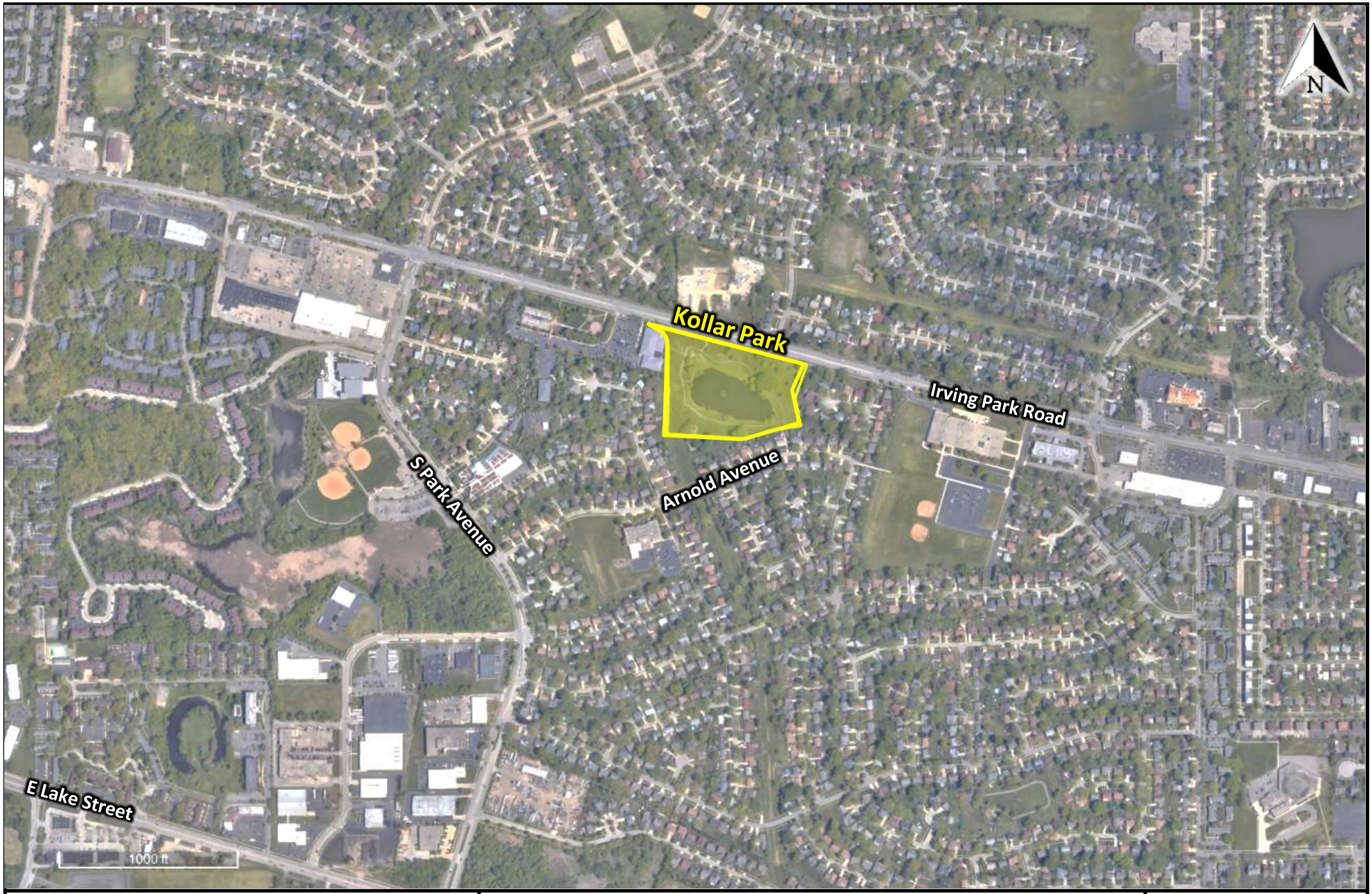
All terms, conditions, and recommendations from Rubino report number G23.178 dated December 4, 2023 remain in effect unless explicitly addressed in this addendum letter. Rubino appreciates the opportunity to continue providing services for this project.

If you have questions pertaining to this report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully Submitted,
Rubino Engineering, Inc.

Michelle Lipinski, P.E
President

Attachments:
Boring Location Plan / Site Vicinity Map
Boring Logs



rubino ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name:	**Kollar Park Pond Improvements**
Project Location:	55 E Irving Park Road Streamwood, Illinois
Client:	**Village of Streamwood**
Rubino Project # :	G23.178_ADD1

Site Vicinity Map



rubino ENGINEERING INC.

425 Shepard Drive
Elgin, Illinois 60123

Project Name:	**Kollar Park Pond Improvements**
Project Location:	55 E Irving Park Road Streamwood, Illinois
Client:	**Village of Streamwood**
Rubino Project # :	G23.178_ADD1

Boring Location Plan 1



rubino ENGINEERING INC. 425 Shepard Drive Elgin, Illinois 60123	**Project Name:**	**Kollar Park Pond Improvements**	**Boring Location Plan 2**
	Project Location:	55 E Irving Park Road Streamwood, Illinois	
	Client:	**Village of Streamwood**	
	Rubino Project # :	G23.178_ADD1	

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-01

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon
Location:	55 E Irving Park Road	Hammer Type:	Automatic
City, State:	Streamwood, Illinois	Boring Location:	Gateway Water Well Plaza
Client:	Village of Streamwood		

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA: Moisture (PL, LL) 0–25–50; STRENGTH, tsf: Qu (Rimac) ✳Qp/Qr 0–2.0–4.0	Additional Remarks
	0					**Surface Elev.:** 803.45 ft					
						Approximately 6 inches of TOPSOIL: dark brown silty clay, with roots and organic matter					
				1	9	Soft to medium stiff, brown and gray silty CLAY, trace sand and gravel		4-3-3 N=6	24		Qp=2.25 tsf
800							CL				
				2	0			2-1-2 N=3	20		
	5										
				3	18	Stiff, brown and gray silty CLAY, trace sand and gravel		4-5-6 N=11	16		Qp=4.50 tsf
795							CL				
				4	16	*Color transitions to just gray at approximately 8½ feet below existing grade.*		3-3-5 N=8	17		Qp=3.75 tsf
	10					End of boring at approximately 10 feet below existing grade.					

Completion Depth:	10.0 ft
Date Boring Started:	10/20/23
Date Boring Completed:	10/20/23
Logged By:	P.P.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types:
- Auger Cutting
- Split-Spoon
- Rock Core
- Direct Push
- Shelby Tube
- Grab Sample
- No Recovery

Latitude: 42.0108250
Longitude: -88.1707676
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By: J. Ignarski

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations and elevation definitions.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING B-07

Rubino Job No.:	G23.178	Drilling Method:	2 ¼ Hollow Stem Auger
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon
Location:	55 E Irving Park Road	Hammer Type:	Automatic
City, State:	Streamwood, Illinois	Boring Location:	Performance Pavilion and Amphitheater
Client:	Village of Streamwood		

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Surface Elev.: 798.22 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	STANDARD PENETRATION TEST DATA: Moisture, PL, LL (0 / 25 / 50); STRENGTH, tsf: Qu (Rimac), Qp/Qr (0 / 2.0 / 4.0)	Additional Remarks
	0					Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter					
				1	0	Dark gray and black ORGANIC SILTY CLAY, trace sand and gravel *No recovery. Soils classified from auger cuttings.*	OL	0-0-0 N=0	127	>>	12% Organic Content
795				2	18	Very soft to soft, gray silty CLAY, trace sand and gravel		0-1-1 N=2	20	Qp=1.00 tsf	
	5			3	18		CL	0-1-2 N=3	21	Qp=1.25 tsf	
790				4	18	Medium stiff to stiff, gray silty CLAY, trace sand and gravel		2-2-4 N=6	20	Qp=1.00 tsf	
	10			5	6			5-5-7 N=12	15	Qp=4.50 tsf	
785				6	15		CL	1-3-4 N=7	16	Qp=2.50 tsf	
	15										
780				7	16			3-4-7 N=11	16	Qp=3.50 tsf	
	20					End of boring at approximately 20 feet below existing grade.					

Completion Depth:	20.0 ft
Date Boring Started:	10/20/23
Date Boring Completed:	10/20/23
Logged By:	P.P.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types:
- Auger Cutting
- Split-Spoon
- Rock Core
- Direct Push
- Shelby Tube
- Grab Sample
- No Recovery

Latitude: 42.0103876
Longitude: -88.1701923
Drill Rig: Geoprobe 7822DT
Remarks:
Log Entry: J. Ignarski
Checked By: J. Ignarski

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations and elevation definitions.

Rubino Engineering, Inc.
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Fax: 847-931-1560

LOG OF BORING B-07A

Rubino Job No.:	G23.178	Drilling Method:	3 ¼ Hollow Stem Auger
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon
Location:	55 E Irving Park Road	Hammer Type:	Automatic
City, State:	Streamwood, Illinois	Boring Location:	Performance Pavilion and Amphitheater
Client:	Village of Streamwood		

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Surface Elev.: 797.50 ft

STANDARD PENETRATION TEST DATA
Moisture | PL | LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac) | Qp/Qr (0 – 2.0 – 4.0)

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
795	0			Blind drill to approximately 16 feet below existing grade.				
790	5							
785	10							
780	15	1	12	Stiff to very stiff, gray silty CLAY, trace sand and gravel	CL	4-7-8 N=15	16	Qp=3.00 tsf
	20	2	12			5-5-6 N=11	19	Qp=2.25 tsf
775	25	3	16			4-7-8 N=15	21	Qp=2.75 tsf
770	30	4	18			3-5-7 N=12	16	Qp=2.50 tsf
765	35	5	18			3-4-5 N=9	19	Qp=2.25 tsf
760	40	6	18			3-4-5 N=9	22	Qp=2.25 tsf
755	45	7	18			7-10-14 N=24	18	Qp=4.50 tsf
750	50	8	18	End of boring at approximately 50 feet below existing grade.		4-4-7 N=11	22	Qp=2.50 tsf

Completion Depth:	50.0 ft
Date Boring Started:	8/4/25
Date Boring Completed:	8/4/25
Logged By:	J.K.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types:
- Auger Cutting
- Split-Spoon
- Rock Core
- Direct Push
- Shelby Tube
- Grab Sample
- No Recovery

Latitude: 42.0103769
Longitude: -88.1700689
Drill Rig: Geoprobe 3126GT
Remarks:
Log Entry: J. Ignarski
Checked By: J. Ignarski

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations and elevation definitions.

Rubino Engineering, Inc.
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Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING LPB-01

Rubino Job No.:	G23.178	Drilling Method:	3 ¼ Hollow Stem Auger
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon
Location:	55 E Irving Park Road	Hammer Type:	Automatic
City, State:	Streamwood, Illinois	Boring Location:	Light Pole
Client:	Village of Streamwood		

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
	0					**Surface Elev.:** 799.90 ft				
						Approximately 12 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
				1	0	FILL: brown silty clay, trace sand and gravel *No recovery. Soils classified from auger cuttings.*		2-2-2 N=4	37	5% Organic Content
795	5			2	2	Black and brown ORGANIC SILTY CLAY, trace sand and gravel *Low recovery. Additional sample taken from auger cuttings.*	OL	2-2-3 N=5	85	>>25% Organic Content
				3	2	Dark gray ORGANIC SILTY CLAY, trace gravel *Low recovery. Additional sample taken from auger cuttings.*	OL	0-0-0 N=0	190	>>28% Organic Content
790	10			4	16	Very soft, gray silty CLAY, trace sand and gravel	CL	0-0-0 N=0	25	Qp=0.50 tsf 1% Organic Content
				5	18	Medium stiff to stiff, gray silty CLAY, trace sand and gravel	CL	0-3-3 N=6	23	Qp=1.25 tsf
785	15			6	18			3-4-6 N=10	19	Qp=2.25 tsf
						End of boring at approximately 15 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac), Qp/Qr (0 – 2.0 – 4.0)

Completion Depth:	15.0 ft
Date Boring Started:	8/4/25
Date Boring Completed:	8/4/25
Logged By:	J.K.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types: Auger Cutting, Split-Spoon, Rock Core, Direct Push, Shelby Tube, Grab Sample, No Recovery

Latitude: 42.0105081
Longitude: -88.1697960
Drill Rig: Geoprobe 3126GT
Remarks:
Log Entry: J. Ignarski
Checked By: J. Ignarski

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations and elevation definitions.

Rubino Engineering, Inc.
425 Shepard Drive
Elgin, IL 60123
Telephone: 847-931-1555
Fax: 847-931-1560

LOG OF BORING LPB-02

Rubino Job No.:	G23.178
Project:	Kollar Pond Park Improvements
Location:	55 E Irving Park Road
City, State:	Streamwood, Illinois
Client:	Village of Streamwood
Drilling Method:	3 ¼ Hollow Stem Auger
Sampling Method:	Split Spoon
Hammer Type:	Automatic
Boring Location:	Light Pole

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Surface Elev.: 800.30 ft

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
800	0			Approximately 10 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
		1	10	Black ORGANIC SILTY CLAY, trace sand and gravel	OL	3-3-2 N=5	57	>> 25% Organic Content
		2	16	Soft to medium stiff, gray silty CLAY, trace sand and gravel		0-2-1 N=3	32	Qp=1.00 tsf 2% Organic Content
795	5	3	18		CL	0-2-2 N=4	22	Qp=0.75 tsf
		4	18	Stiff, gray silty CLAY, trace sand and gravel		3-4-6 N=10	19	Qp=2.50 tsf
790	10	5	18		CL	4-5-7 N=12	18	Qp=2.50 tsf
		6	18			3-3-5 N=8	13	Qp=2.75 tsf
	15			End of boring at approximately 15 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac), Qp/Qr (0 – 2.0 – 4.0)

Completion Depth:	15.0 ft
Date Boring Started:	8/4/25
Date Boring Completed:	8/4/25
Logged By:	J.K.
Drilling Contractor:	Rubino Engineering, Inc.

Sample Types: Auger Cutting, Split-Spoon, Rock Core, Direct Push, Shelby Tube, Grab Sample, No Recovery

Latitude: 42.0106013
Longitude: -88.1701883
Drill Rig: Geoprobe 3126GT
Remarks:
Log Entry: J. Ignarski
Checked By: J. Ignarski

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations and elevation definitions.

Rubino Engineering, Inc.
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Telephone: 847-931-1555
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LOG OF BORING LPB-03

Rubino Job No.:	G23.178	Drilling Method:	3 ¼ Hollow Stem Auger
Project:	Kollar Pond Park Improvements	Sampling Method:	Split Spoon
Location:	55 E Irving Park Road	Hammer Type:	Automatic
City, State:	Streamwood, Illinois	Boring Location:	Light Pole
Client:	Village of Streamwood		

WATER LEVELS***

While Drilling	N/A
Upon Completion	N/A
Delay	N/A

Station: N/A
Offset: N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	Classification	SPT Blows per 6-inch	Moisture, %	Additional Remarks
	0					**Surface Elev.:** 804.40 ft				
						Approximately 10 inches of TOPSOIL: dark brown silty clay, with roots and organic matter				
				1	8	FILL: dark brown and black silty clay, trace sand and gravel		4-5-4 N=9	22	
800	5			2	8			2-5-4 N=9	39	7% Organic Content
				3	5	Medium stiff, brown and gray silty CLAY, trace sand and gravel		2-2-2 N=4	20	Qp=1.25 tsf
795	10			4	14		CL	1-3-3 N=6	22	Qp=2.00 tsf
				5	10	Stiff, gray silty CLAY, trace sand and gravel		3-4-6 N=10	20	
790	15			6	14		CL	3-5-6 N=11	16	Qp=2.50 tsf
						End of boring at approximately 15 feet below existing grade.				

STANDARD PENETRATION TEST DATA
Moisture, PL, LL (0 – 25 – 50)
STRENGTH, tsf: Qu (Rimac), Qp/Qr (0 – 2.0 – 4.0)

Completion Depth:	15.0 ft	Latitude:	42.0108053
Date Boring Started:	8/4/25	Longitude:	-88.1701129
Date Boring Completed:	8/4/25	Drill Rig:	Geoprobe 3126GT
Logged By:	J.K.	Remarks:	
Drilling Contractor:	Rubino Engineering, Inc.	Log Entry:	J. Ignarski
		Checked By:	J. Ignarski

Sample Types: Auger Cutting, Split-Spoon, Rock Core, Direct Push, Shelby Tube, Grab Sample, No Recovery

The stratification lines represent approximate boundaries. The transition may be gradual.
***Please reference the geotechnical report text for specific groundwater / dewatering recommendations and elevation definitions.

rubino ENGINEERING INC.

ADDENDUM LETTER

November 7, 2025

To: Matt Mann, P.E.
Director of Public Works/Village Engineer
Village of Streamwood
565 S. Bartlett Road
Streamwood, Illinois 60107
630-736-3850

Via email: mmann@streamwood.org

Re: **Additional Geotechnical Engineering Services Report Addendum 2**
Kollar Park Pond Improvements
55 E Irving Park Road
Streamwood, Illinois

Rubino Project No. G23.178_ADD 2

Dear Mr. Mann,

Rubino Engineering, Inc. is submitting this addendum letter in response to the request for additional information based on the geotechnical exploration services provided and reported on in Addendum Letter 1 (dated September 2, 2025) pavilion canopy and deck and light pole foundations at Kollar Park in Streamwood, Illinois.

Change Order Authorization

- Rubino Change Order M23.178_Change Order 01 dated July 17, 2025; Signed and authorized by Matt Mann, PE, Director of Public Works/Village on July 23, 2025.

Project Information and Correspondence

- Rubino Engineering, Inc. submitted a geotechnical engineering addendum letter for the Kollar Park Improvements project under Rubino project number G23.178_ADD1 dated September 2, 2025.
- Email from Matt Mann of the Village on October 23, 2025 including questions and comments on the G23.178_ADD1 addendum letter from the engineering team at Confluence.

Scope of Services – Addendum 2

This addendum report briefly outlines the following per the request of Confluence:

- *Additional discussion of stone column recommendations for the proposed pavilion canopy and deck*
- *Additional soil parameters for light pole foundation borings*

Light Pole Foundation Additional Soil Parameters (LPB-01 to LPB-03)

Table 1b below includes estimated parameters based on the subsurface conditions encountered in borings LPB-01, LPB-02, and LPB-03 for the proposed shaft diameter design. The allowable end bearing values include a factor of safety of 3 and the allowable skin friction values include a factor of safety of 2. Lateral parameters have been included for use in discrete element analysis software such as LPILE or COM624P.

Table 1b: Light Pole Soil Parameters

Soil Type	Approximate Depth Range (feet below existing grade)	Estimated Unit Weight (pcf)	Allowable end bearing (psf)	Estimated Average Undrained Shear strength (psf)	Allowable Skin Friction** (psf)	Static Lateral Modulus (pci)	Strain Factor, E_{50}
LPB-01							
Very soft, gray silty CLAY	8 ½ - 11 feet BEG	100	n/a	300	80	40	0.02
Medium stiff, gray silty CLAY	11 – 13 ½ feet BEG	120	3,000	1,000	275	250	0.008
Stiff, gray silty CLAY	13 ½ - 15 feet BEG	125	5,000	1,750	480	600	0.007
LPB-02							
Soft to medium stiff, gray silty CLAY	3 ½ - 8 ½ feet BEG	110	1,800	600	165	55	0.013
Stiff, gray silty CLAY	8 ½ -15 feet BEG	125	5,000	1,750	480	600	0.007
LPB-03							
FILL: dark brown and black silty clay	0 – 6 ½ feet BEG	110	n/a	300	80	40	0.02
Medium stiff, brown and gray silty CLAY	6 ½ - 8 ½ feet BEG	120	3,000	1,000	275	250	0.008
Medium stiff to stiff, gray silty CLAY	8 ½ - 15 feet BEG	125	5,000	1,750	480	600	0.007

*Upper 5 feet of the shaft should be ignored in the development of skin friction.
**The skin friction should be ignored one shaft diameter above the bearing depth

Lateral Load Analysis

The lateral capacity is directly linked to the strain characteristics of the foundation element. The lateral loads on the piers can be calculated with the parameters provided in *Table 1b* above. These parameters are for analytical programs such as L-Pile or COM624P which will analyze both the applied load verse strain resistance of the soil and the deflection of the structural element. The parameters given are ultimate values and a factor of safety of 2.0 should be applied to these values to evaluate the allowable limits. In general, the upper 5-feet below grade of the pier is ignored in the lateral capacity for exterior piles and for areas exposed to footings.

Lateral Earth Pressures

The following table provides the estimated lateral earth pressure coefficients for the soils encountered at the light pole foundation locations.

Table 2b: "K-Factor" Lateral Earth Pressures

Soil Description	Approximate Depth Range (feet below existing grade)	Estimated Friction Angle	K_O	K_A	K_P
LPB-01					
Very soft, gray silty CLAY	8 ½ - 11 feet BEG	25°	0.58	0.41	2.46

Soil Description	Approximate Depth Range (feet below existing grade)	Estimated Friction Angle	K_O	K_A	K_P
Medium stiff, gray silty CLAY	11 – 13 ½ feet BEG	26°	0.56	0.39	2.56
Stiff, gray silty CLAY	13 ½ - 15 feet BEG	27°	0.55	0.38	2.66
LPB-02					
Soft to medium stiff, gray silty CLAY	3 ½ - 8 ½ feet BEG	25°	0.58	0.41	2.46
Stiff, gray silty CLAY	8 ½ -15 feet BEG	27°	0.55	0.38	2.66
LPB-03					
FILL: dark brown and black silty clay	0 – 6 ½ feet BEG	25°	0.58	0.41	2.46
Medium stiff, brown and gray silty CLAY	6 ½ - 8 ½ feet BEG	26°	0.56	0.39	2.56
Medium stiff to stiff, gray silty CLAY	8 ½ - 15 feet BEG	27°	0.55	0.38	2.66
B-07					
Very soft to soft, gray silty CLAY	3 ½ - 8 ½ feet BEG	25°	0.58	0.41	2.46
Medium stiff, gray silty CLAY	8 ½ - 11 feet BEG	26°	0.56	0.39	2.56
Medium stiff to stiff, gray silty CLAY	11 – 20 feet BEG	27°	0.55	0.38	2.66

*BEG = Below Existing Grade

Additional Discussion on Shallow Foundation Option supported by Stone Columns for Proposed Pavilion Canopy and Deck (B-07 / B-07A)

The proposed pavilion canopy and deck can be supported on shallow, spread footing foundations that are supported by a stone column system to be designed and installed by a specialty contractor.

Rubino recommends the shallow foundations bearing on stone columns or ground improvement system be sized to no greater than 3,000 psf bearing capacity. The final design of the ground improvement should be performed by the specialty contractor.

Exterior footings should be located at a depth of at least 3 ½ feet below the outside final exterior grades to provide adequate frost protection. If the structure is constructed during winter months or if the footings will likely be subjected to freezing temperatures after construction is completed, then the footings should be protected from freezing.

Please reference report addendum G23.178_ADD1 for more information on this option.

Seismic Site Classification – Light Pole Foundations

The 2015 International Building Code requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and strata types). Based on the estimated depth to rock, the estimated shear strength of the soil at the borings, and the recommended removal of organic soils from the site, Site Class "E" is recommended.

This site class is recommended based on Rubino's opinion and experience in the area that the consistency of the soils below the depth explored remain consistent or improve in density. Actual determination of soil properties to a depth of 100 feet was beyond the scope of this project.

The SEAOC/OSHPD probabilistic ground motion values near latitude 42.0105081° and longitude –88.1697960° are shown in the table to the right.

Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	E

Type	Value	Description
S_S	0.145	MCE_R ground motion. (for 0.2 second period)
S_1	0.062	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.362	Site-modified spectral acceleration value
S_{M1}	0.217	Site-modified spectral acceleration value
S_{DS}	0.241	Numeric seismic design value at 0.2 second SA
S_{D1}	0.145	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	C	Seismic design category
F_a	2.5	Site amplification factor at 0.2 second
F_v	3.5	Site amplification factor at 1.0 second
PGA	0.076	MCE_G peak ground acceleration

Closing

All terms, conditions, and recommendations from Rubino report number G23.178 dated December 4, 2023 and Rubino report addendum number G23.178_ADD1 dated September 2, 2025 remain in effect unless explicitly addressed in this addendum letter. Rubino appreciates the opportunity to continue providing services for this project.

If you have questions pertaining to this report, or if Rubino may be of further service, please contact our office at (847) 931-1555.

Respectfully Submitted,
Rubino Engineering, Inc.

Michelle Lipinski, P.E
President