

PROJECT MANUAL

**Elgin Sports Complex Expansion  
Phase 1**

475 Sports Way Unit A & Unit B  
Elgin, Illinois



PREPARED FOR:

**CITY OF ELGIN**

Elgin, IL

## TABLE OF CONTENTS

### SECTIONS

### ORGANIZATION

#### DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

INFORMATION FOR AND INSTRUCTIONS TO BIDDERS	City of Elgin
CITY- CONTRACTOR AGREEMENT BID 24-011.	City of Elgin
BOND – BID	City of Elgin
BOND – PAYMENT	City of Elgin
BOND – PERFORMANCE	City of Elgin
RESPONSIBLE BIDDERS ORDINANCE COVER SHEET	City of Elgin
EEO DOCS WITH RESPONSIBLE BIDDERS AFFIDAVIT	City of Elgin
ELGIN RESIDENCY ORDINANCE - PROJECTS OVER \$100,000	City of Elgin
IDES CHICAGOLAND DEMOGRAPHICS 2023	City of Elgin
PREVAILING WAGE ACT 2019 SUMMARY	City of Elgin
PREVAILING WAGE RESOLUTION 2018	City of Elgin
KANE COUNTY PREVAILING WAGE RATES	City of Elgin
PROCUREMENT ORDINANCE	City of Elgin
RESIDENCY ORDINANCE COVER SHEET	City of Elgin
SECTION 003119 - EXISTING CONDITION INFORMATION	SmithGroup
SECTION 003132 - GEOTECHNICAL DATA	SmithGroup

#### DIVISION 01 - GENERAL REQUIREMENTS

SECTION 011000 - SUMMARY	SmithGroup
SECTION 012300 - ALTERNATES	SmithGroup
SECTION 012500 - SUBSTITUTION PROCEDURES	SmithGroup
SECTION 012510 - SUBSTITUTION REQUEST FORM	SmithGroup
SECTION 012600 - CONTRACT MODIFICATION PROCEDURES	SmithGroup
SECTION 012900 - PAYMENT PROCEDURES	SmithGroup
SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION	SmithGroup
SECTION 013110 - REQUEST FOR INFORMATION	SmithGroup
SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION	SmithGroup
SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION	SmithGroup
SECTION 013300 - SUBMITTAL PROCEDURES	SmithGroup
SECTION 013330 - SUBMITTAL COMPLIANCE FORM	SmithGroup
SECTION 013573 - DELEGATED DESIGN REQUIREMENTS AND PROCEDURES	SmithGroup
SECTION 014000 - QUALITY REQUIREMENTS	SmithGroup
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS	SmithGroup
SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION	SmithGroup
SECTION 016000 - PRODUCT REQUIREMENTS	SmithGroup
SECTION 017300 - EXECUTION	SmithGroup
SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL	SmithGroup
SECTION 017700 - CLOSEOUT PROCEDURES	SmithGroup
SECTION 017823 - OPERATION AND MAINTENANCE DATA	SmithGroup
SECTION 017839 - PROJECT RECORD DOCUMENTS	SmithGroup
SECTION 017900 - DEMONSTRATION AND TRAINING	SmithGroup

#### DIVISION 02 - EXISTING CONDITIONS

NOT APPLICABLE

## **VOLUME 1 - SITE**

(Volume 1 – Site is noted with an "S-" prefix)

### **DIVISION S-03 - CONCRETE**

SECTION 033000 - S-CAST-IN-PLACE CONCRETE

SmithGroup

### **DIVISION 04 - MASONRY**

NOT APPLICABLE

### **DIVISION S-05 - METALS**

SECTION 051200 - S-STRUCTURAL STEEL FRAMING

SmithGroup

### **DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

NOT APPLICABLE

### **DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

NOT APPLICABLE

### **DIVISION 08 - OPENINGS**

NOT APPLICABLE

### **DIVISION 09 - FINISHES**

NOT APPLICABLE

### **DIVISION 10 - SPECIALTIES**

NOT APPLICABLE

### **DIVISION 11 - EQUIPMENT**

NOT APPLICABLE

### **DIVISION 12 - FURNISHINGS**

NOT APPLICABLE

DIVISION 13 - SPECIAL CONSTRUCTION

NOT APPLICABLE

DIVISION 14 - CONVEYING EQUIPMENT

NOT APPLICABLE

DIVISION 21 - FIRE SUPPRESSION

NOT APPLICABLE

DIVISION 22 - PLUMBING

NOT APPLICABLE

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

NOT APPLICABLE

DIVISION 25 - INTEGRATED AUTOMATION

NOT APPLICABLE

DIVISION S-26 - ELECTRICAL

SECTION 260400 - S-COMMON WORK RESULTS FOR ELECTRICAL	SmithGroup
SECTION 260519 - S-LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	SmithGroup
SECTION 260526 - S-GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	SmithGroup
SECTION 260533 - S-RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	SmithGroup
SECTION 260543 - S-UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL	SmithGroup
SECTION 260553 - S-IDENTIFICATION FOR ELECTRICAL SYSTEMS	SmithGroup
SECTION 260573 - S-POWER SYSTEM STUDIES	SmithGroup
SECTION 260800 - S-COMMISSIONING OF ELECTRICAL SYSTEMS	SmithGroup
SECTION 262213 - S-LOW-VOLTAGE DISTRIBUTION TRANSFORMERS	SmithGroup
SECTION 262416 - S-PANELBOARDS	SmithGroup
SECTION 262726 - S-WIRING DEVICES	SmithGroup
SECTION 262743 - S-ELECTRIC-VEHICLE SERVICE EQUIPMENT - AC LEVEL 1 AND LEVEL 2	SmithGroup
SECTION 262816 - S-ENCLOSED SWITCHES AND CIRCUIT BREAKERS	SmithGroup
SECTION 263600 - S-TRANSFER SWITCHES	SmithGroup
SECTION 265600 - S-EXTERIOR LIGHTING	SmithGroup
SECTION 265668 - S-EXTERIOR ATHLETIC LIGHTING	SmithGroup

DIVISION 27 - COMMUNICATIONS

NOT APPLICABLE

## DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

NOT APPLICABLE

## DIVISION S-31 - EARTHWORK

SECTION 311000 - S-SITE CLEARING	SmithGroup
SECTION 312000 - S-EARTH MOVING	SmithGroup
SECTION 316329 - S-DRILLED CONCRETE PIERS AND SHAFTS	SmithGroup

## DIVISION S-32 - EXTERIOR IMPROVEMENTS

SECTION 321216 - S-ASPHALT PAVING	SmithGroup
SECTION 321316 - S-CONCRETE PAVING	SmithGroup
SECTION 321373 - S-CONCRETE PAVING JOINT SEALANTS	SmithGroup
SECTION 321443 - S-POROUS UNIT PAVING	SmithGroup
SECTION 321713 - S-PARKING BUMPERS	SmithGroup
SECTION 321723 - S-PAVEMENT MARKINGS	SmithGroup
SECTION 321726 - S-TACTILE WARNING SURFACING	SmithGroup
SECTION 321813 - S-SYNTHETIC TURF	SmithGroup
SECTION 321813.10 - S-PLAYGROUND TURF	SmithGroup
SECTION 323113 - S-CHAIN LINK FENCES AND GATES	SmithGroup
SECTION 323223 - S-SEGMENTAL RETAINING WALLS	SmithGroup
SECTION 323300 - S-SITE FURNISHINGS AND ORNAMENTAL FENCE	SmithGroup
SECTION 328400 - S-LANDSCAPE IRRIGATION	Hines
SECTION 329100 - S-SOIL PREPARATION (TOPSOIL)	SmithGroup
SECTION 329200 - S-LAWNS	SmithGroup
SECTION 329300 - S-EXTERIOR PLANTINGS	SmithGroup
SECTION 329600 - S-TRANSPLANTING	SmithGroup

## DIVISION S-33 - UTILITIES

SECTION 331100 - S-WATER DISTRIBUTION PIPING	SmithGroup
SECTION 332200 - S-SEWAGE PUMPING STATION	SmithGroup
SECTION 333100 - S-SANITARY SEWERS (GRAVITY)	SmithGroup
SECTION 334100 - S-STORM DRAINAGE PIPING	SmithGroup
SECTION 334600 - S-SUBDRAINAGE	SmithGroup

## DIVISION 34 - TRANSPORTATION

NOT APPLICABLE

## DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION

NOT APPLICABLE

## DIVISION 40 - PROCESS INTEGRATION

NOT APPLICABLE

DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT

NOT APPLICABLE

DIVISION 42 - PROCESS HEATING, COOLING, AND DRYING EQUIPMENT

NOT APPLICABLE

DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT

NOT APPLICABLE

DIVISION 44 - POLLUTION CONTROL EQUIPMENT

NOT APPLICABLE

DIVISION 45 - INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT

NOT APPLICABLE

DIVISION 46 - WATER AND WASTEWATER EQUIPMENT

NOT APPLICABLE

DIVISION 48 - ELECTRICAL POWER GENERATION

NOT APPLICABLE

**VOLUME 2 - SUPPORT FACILITIES** (noted with a "B-" prefix)

DIVISION S-03 - CONCRETE

SECTION 033546 - B-CONCRETE FLOOR SEALER AND HARDENER HPZS

DIVISION 04 - MASONRY

SECTION 042000 - B-UNIT MASONRY HPZS

DIVISION S-05 - METALS

055000 - B-METAL FABRICATIONS HPZS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

061053 - B-MISCELLANEOUS ROUGH CARPENTRY HPZS

061600 - B-SHEATHING HPZS

062013 - B-EXTERIOR FINISH CARPENTRY	HPZS
066400 - B-PLASTIC (FRP) PANELING	HPZS

#### DIVISION 07 - THERMAL AND MOISTURE PROTECTION

071113 - B-BITUMINOUS DAMPPROOFING	HPZS
072100 - B-THERMAL INSULATION	HPZS
072119 - B-FOAMED-IN-PLACE INSULATION	HPZS
072600 - B-BELOW-GRADE VAPOR RETARDERS	HPZS
074113.16 - B-STANDING-SEAM METAL ROOF PANELS	HPZS
074213.13 - B-FORMED METAL WALL PANELS	HPZS
074213.19 - B-INSULATED METAL WALL PANELS	HPZS
074646 - B-FIBER-CEMENT SIDING	HPZS
076200 - B-SHEET METAL FLASHING AND TRIM	HPZS
077100 - B-ROOF SPECIALTIES	HPZS
077200 - B-ROOF ACCESSORIES	HPZS
079200 - B-JOINT SEALANTS	HPZS

#### DIVISION 08 - OPENINGS

081113 - B-HOLLOW METAL DOORS AND FRAMES	HPZS
083313 - B-COILING COUNTER DOORS	HPZS
083613 - B-SECTIONAL DOORS	HPZS
085413 - B-FIBERGLASS WINDOWS	HPZS
085653 - B-SECURITY WINDOWS	HPZS
088000 - B-GLAZING	HPZS
088300 - B-MIRRORS	HPZS

#### DIVISION 09 - FINISHES

092216 - B-NON-STRUCTURAL METAL FRAMING	HPZS
092900 - B-GYPSUM BOARD	HPZS
093013 - B-TILING	HPZS
095113 - B-ACOUSTICAL PANEL CEILINGS	HPZS
096513 - B-RESILIENT BASE AND ACCESSORIES	HPZS
096723 - B-RESINOUS FLOORING	HPZA
099113 - B-EXTERIOR PAINTING	HPZS
099123 - B-INTERIOR PAINTING	HPZS
099623 - B-GRAFFITI-RESISTANT COATINGS	HPZS

#### DIVISION 10 - SPECIALTIES

101423.16 - B-ROOM-IDENTIFICATION PANEL SIGNAGE	HPZS
102113.17 - B-PHENOLIC-CORE TOILET COMPARTMENTS	HPZS
102800 - B-TOILET ACCESSORIES	HPZS
104413 - B-FIRE PROTECTION CABINETS	HPZS
104416 - B-FIRE EXTINGUISHERS	HPZS

#### DIVISION 11 - EQUIPMENT

NOT APPLICABLE

## DIVISION 12 - FURNISHINGS

123616 - B-METAL COUNTERTOPS	HPZS
123661.16 - B-SOLID SURFACING COUNTERTOPS	HPZS

## DIVISION 13 - SPECIAL CONSTRUCTION

133419 - B-METAL BUILDING SYSTEMS	HPZS
-----------------------------------	------

## DIVISION 14 - CONVEYING EQUIPMENT

NOT APPLICABLE

## DIVISION 21 - FIRE SUPPRESSION

NOT APPLICABLE

## DIVISION 22 - PLUMBING

220500 - B – COMMON WORK RESULTS FOR PLUMBING	A+S
220516 - B - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING	A+S
220517 - B - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	A+S
220518 - B - ESCUTCHEONS FOR PLUMBING PIPING	A+S
220519 - B - METERS AND GAGES FOR PLUMBING PIPING	A+S
220523.12 - B - BALL VALVES FOR PLUMBING PIPING	A+S
220523.13 - B - BUTTERFLY VALVES FOR PLUMBING PIPING	A+S
220523.14 - B - CHECK VALVES FOR PLUMBING PIPING	A+S
220523.15 - B - GATE VALVES FOR PLUMBING PIPING	A+S
220529 - B - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT	A+S
220533 - B - HEAT TRACING FOR PLUMBING PIPING	A+S
220553 - B - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	A+S
220593 - B - TESTING, ADJUSTING, AND BALANCING FOR PLUMBING	A+S
220716 - B - PLUMBING EQUIPMENT INSULATION	A+S
220719 - B - PLUMBING PIPING INSULATION	A+S
221113 - B - FACILITY WATER DISTRIBUTION PIPING	A+S
221116 - B - DOMESTIC WATER PIPING	A+S
221119 - B - DOMESTIC WATER PIPING SPECIALTIES	A+S
221123.21 - B - INLINE, DOMESTIC WATER PUMPS	A+S
221313 - B - FACILITY SANITARY SEWERS	A+S
221316 - B - SANITARY WASTE AND VENT PIPING	A+S
221319 - B - SANITARY WASTE PIPING SPECIALTIES	A+S
221319.13 - B - SANITARY DRAINS	A+S
221323 - B - SANITARY WASTE INTERCEPTORS	A+S
221363 - B - FACILITY RAINWATER STORAGE TANKS	A+S
221413 - B - STORM DRAINAGE PIPING	A+S
221423 - B - STORM DRAINAGE PIPING SPECIALTIES	A+S
223300 - B - ELECTRIC, DOMESTIC-WATER HEATERS	A+S
224213.13 - B - COMMERCIAL WATER CLOSETS	A+S
224213.16 - B - COMMERCIAL URINALS	A+S
224216.13 - B - COMMERCIAL LAVATORIES	A+S
224216.16 - B - COMMERCIAL SINKS	A+S
224716 - B - DRINKING FOUNTAINS	A+S



## DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

230010 - B - HVAC GENERAL REQUIREMENTS	A+S
230513 - B - COMMON MOTOR & ELEC REQS FOR HVAC EQUIPMENT	A+S
230517 - B - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	A+S
230529 - B - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT	A+S
230548 - B - VIBRATION AND SEISMIC CONTROLS FOR HVAC	A+S
230553 - B - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	A+S
230593 - B - TESTING, ADJUSTING, AND BALANCING FOR HVAC	A+S
230713 - B - DUCT INSULATION	A+S
230716 - B - HVAC EQUIPMENT INSULATION	A+S
230719 - B - HVAC PIPING INSULATION	A+S
230800 - B - COMMISSIONING OF HVAC	A+S
230900 - B - INSTRUMENTATION AND CONTROL FOR HVAC	A+S
230993 - B - SEQUENCE OF OPERATION FOR HVAC CONTROLS	A+S
232300 - B - REFRIGERANT PIPING	A+S
233113 - B - METAL DUCTS	A+S
233300 - B - AIR DUCT ACCESSORIES	A+S
233346 - B - FLEXIBLE DUCTS	A+S
233416 - B - CENTRIFUGAL HVAC FANS	A+S
233423 - B - HVAC POWER VENTILATORS	A+S
233433.13 - B - COMMERCIAL AIR CURTAINS	A+S
233500 - B - GARAGE GAS DETECTION AND ALARM SYSTEM	A+S
233713 - B - DIFFUSERS, REGISTERS, AND GRILLES	A+S
233733 - B - FIXED LOUVERS	A+S
237219 - B - FIXED PLATE AIR-TO-AIR HEAT RECOVERY UNITS	A+S
238126 - B - SPLIT SYSTEM AIR CONDITIONERS AND HEAT PUMPS	A+S
238239 - B - PROPELLOR UNIT HEATERS	A+S
238323 - B - WALL AND CEILING UNIT HEATERS	A+S

## DIVISION 25 - INTEGRATED AUTOMATION

NOT APPLICABLE

## DIVISION S-26 - ELECTRICAL

260500 - B - COMMON WORK RESULTS FOR ELECTRICAL	A+S
260519 - B - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	A+S
260526 - B - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	A+S
260529 - B - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	A+S
260533 - B - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	A+S
260543 - B - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS	A+S
260544 - B - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING	A+S
260548 - B - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS	A+S
260553 - B - IDENTIFICATION FOR ELECTRICAL SYSTEMS	A+S
260923 - B - LIGHTING CONTROL DEVICES	A+S
262416 - B - PANELBOARDS	A+S
262726 - B - WIRING DEVICES	A+S
262813 - B - FUSES	A+S
262816 - B - ENCLOSED SWITCHES AND CIRCUIT BREAKERS	A+S
265100 - B - INTERIOR LIGHTING	A+S
265600 - B - EXTERIOR LIGHTING	A+S

## DIVISION 27 - COMMUNICATIONS

NOT APPLICABLE

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

283111 - B - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

A+S

DIVISION S-31 - EARTHWORK

SECTION 313600 - B-GABION WALLS

HPZS

DIVISION S-32 - EXTERIOR IMPROVEMENTS

NOT APPLICABLE

DIVISION S-33 - UTILITIES

NOT APPLICABLE

DIVISION 34 - TRANSPORTATION

NOT APPLICABLE

DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION

NOT APPLICABLE

DIVISION 40 - PROCESS INTEGRATION

NOT APPLICABLE

DIVISION 41 - MATERIAL PROCESSING AND HANDLING EQUIPMENT

NOT APPLICABLE

DIVISION 42 - PROCESS HEATING, COOLING, AND DRYING EQUIPMENT

NOT APPLICABLE

DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT

NOT APPLICABLE

DIVISION 44 - POLLUTION CONTROL EQUIPMENT

NOT APPLICABLE

DIVISION 45 - INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT

NOT APPLICABLE

DIVISION 46 - WATER AND WASTEWATER EQUIPMENT

NOT APPLICABLE

DIVISION 48 - ELECTRICAL POWER GENERATION

NOT APPLICABLE

**APPENDIX**

ELGIN SPORTS COMPLEX: POTHOLING LOCATION DIAGRAM  
SOUTH REMNANT OF DRIVE  
NORTH REMNANTS OF DRIVE  
REMNANTS OF PULL OFF  
GEOTECHNICAL INVESTIGATION REPORT

City of Elgin  
City of Elgin  
City of Elgin  
City of Elgin  
GSG

*The above listed documents comprise the Project Manual for the project listed above. Where numerical sequence of sections is interrupted, such interruptions are intentional.*

*The complete Project Manual for this project consists of the listed Volume(s), which must not be separated for any reason. The Architect and Owner disclaim any responsibility for any assumptions made by a contractor or subcontractor who does not receive a complete Project Manual, including all sections listed in the Table of Contents.*

END OF SECTION

# INFORMATION FOR AND INSTRUCTIONS TO BIDDERS

## 1. DEFINITIONS AND TERMINOLOGY

Definitions, of the General Terms and Conditions of the Contract (“General Terms and Conditions”) included in the Project Manual are incorporated by reference as if fully rewritten herein. In the event of a conflict between the definitions herein and those found in the General Terms and Conditions, the former shall govern for the purpose of this section only. All other terms which are not herein defined have their ordinary dictionary meaning.

**ADDENDUM (ADDENDA, PLURAL)**-An Addendum is a document issued by the City prior to the opening of the General Bids which clarifies, amends, or modifies the Bidding Documents or the Contract Documents.

**ALTERNATE BID**-An Alternate Bid (or An Alternate) is a proposal for work which is bid alternatively to the original bid proposal pursuant to instructions contained in the Bid Form. Such alternative bids may include proposals for work that is different in scope from that contained in the Base Bid.

**BASE BID**-A Base Bid is the sum proposed by a Bidder to perform the Work and does not include any Alternate Bids.

**BID**-A Bid is a proposal to do the Work for a specified sum and includes accompanying forms which are required to be submitted.

**BIDDER**-A Bidder is an entity that submits a Bid.

**BIDDING DOCUMENTS**-The Bidding Documents are comprised of the entire Project Manual, which includes, but is not limited to, the Invitation to Bid (advertisement), the Instructions to Bidders, all of the forms (e.g., Bid forms, sample Agreement form, bond forms), the wage rates, the General Terms and Conditions of the Contract, any supplementary terms and conditions thereto, the Drawings, the Specifications, and all addenda.

**BUSINESS DAYS**-Business days are defined as all days of the week excluding Saturdays, Sundays, and those holidays for which the City offices are closed for observance.

**CONTRACT DOCUMENTS**- The Contract Documents consist of the Agreement, the Certificates of Insurance, Bonds, Notice of Award, Notice to Proceed, General Conditions, Supplementary Conditions, Specifications, Drawings, Addenda, Contractor’s Bid, City Forms, and any subsequent written amendments to the documents listed herein.

**PROJECT**-The Project is the total Construction to be provided under the Contract Documents and the Work may be the whole or a part of the Project as indicated elsewhere in the Contract Documents and may include construction by the City or by separate contractors. The Project is the Work described in the Bidding Documents.

**PURCHASING DEPARTMENT**-The Purchasing Department refers to the City of Elgin Purchasing Department located at 150 Dexter Court, Elgin IL.

**WORK**-Work refers to the services and the entire completed construction or the various separately identifiable parts thereof required by the Contract Documents, including all labor, materials, and equipment furnished, furnished and incorporated into the Project, or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

## 2. COPIES OF BIDDING DOCUMENTS

A Bidder may obtain complete sets of Bidding Documents <https://cityofelgin.ionwave.net/VendorRegistration/PreliminaryInfo.aspx>.

No partial sets of Bidding Documents shall be issued.

It is the responsibility of the Bidder to insure that it has obtained a complete set of Bidding Documents. Complete sets of Bidding Documents shall be used in preparing Bids. The City shall not be liable for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, or any other reason, in preparing the Bids.

Distribution of the Bidding Documents is for the sole purpose of obtaining Bids and does not confer a license or grant permission for any other use of the Bidding Documents.

## 3. STATE WAGE RATE REQUIREMENTS

The minimum prevailing wage rates are included with the Bidding Documents and apply to this Project. Bidder shall comply with all statutory requirements regarding prevailing wage rates.

Bidder, if awarded the contract, will keep accurate records showing the name, address, telephone number, social security number, occupation, hourly wages (including itemized hourly cash and fringe rates), hours worked each day, gross and net weekly wages for each laborer, worker and mechanic employed on the Work. The records shall be provided on a weekly basis to the City. The bidder shall collect and forward to the City the certified payrolls of all its subcontractors. The prevailing wage for any trade may change during the life of the Project. The selected Bidder and all its subcontractors shall be responsible for checking the Illinois Department of Labor web page (<http://www.state.il.us/agency/idol/>) to ensure that they are paying the current rate. If the City discovers any discrepancies between the prevailing wage rates as apply to the Work and the Bidder's payrolls, or if the Bidder or a subcontractor fails to submit payrolls, no further payments shall be made to the Bidder until the discrepancy is corrected.

## 4. QUESTIONS AND INTERPRETATIONS

All questions about the meaning or intent of the Bidding Documents shall be submitted in writing to the City's Purchasing Director or applicable department contact specified in the Invitation no later than five calendar days prior to the date set for the opening of Bids. Any questions received after such time shall be answered at the discretion of the City.

Written clarifications or interpretations shall be issued by the Purchasing Department in the form of an Addendum. Only questions answered by an Addendum shall be binding. Oral clarifications or interpretations shall be without legal effect. Addenda shall either be faxed or emailed to all persons having received Bidding Documents from the Purchasing Department.

Each Bidder shall be responsible for determining that it has received all Addenda issued.

**A Mandatory Pre-Bid meeting will be held on April 24, 2024 at 3:00 pm CDT. The meeting will be held at the Centre of Elgin, 100 Symphony Way, Elgin, IL 60120 in the Administration Offices conference room. The Mandatory Pre-Bid meeting will also be held via ZOOM at this link <https://us06web.zoom.us/j/5244460513?pwd=QXkzSkIOMjI2T1hKTVh2eG9hbG9Odz09&omn=89574302964>. Meeting ID: 524 446 0513, Passcode: 0K70sB. Or one tap mobile 13126266799,,5244460513#.Any entity planning to submit a Bid must attend or participate.**

## 5. THE BID

### BIDDER'S REPRESENTATIONS.

In submitting a Bid, the Bidder represents that:

- it has read and examined the Bidding Documents thoroughly;
- it understands the Bidding Documents;
- the Bid is made in accordance with the Bidding Documents;
- it has visited the site, has become familiar with the conditions of the site and the surrounding area, and has familiarized itself with local conditions that may in any manner affect cost, progress, or performance of the Work;
- it has correlated its own observations with the Bidding Documents;
- it has found no errors, conflicts, ambiguities, or omissions in the Bidding Documents, except for those that it has brought to the City's attention either orally at a pre-bid conference or in writing at least five (5) calendar days prior to submitting its Bid;
- it is familiar with all of the applicable Federal, State, and City laws, rules, regulations, and procedures affecting its Bid and its Bid is in conformity with those laws, rules, regulations, and procedures;
- the Bidder has complied with every requirement of these Instructions and that the Bidding Documents are sufficient in scope and detail to indicate and convey an understanding of all terms and conditions for the performance of the Work; and
- Bidder hereby waives and releases any and all rights it may have pursuant to the Public Construction Contract Act, 30 ILCS 557/1 et.seq.

### BID CONTENTS.

The checklists below are included for the bidders' convenience only and shall not be construed to constitute a waiver or abridgement of the City's right to reject any or all bids.

A Bid shall include:

- a completed Bid form
- a Bid deposit;
- Certification Requirements
- Bidder's Employee Utilization
- Sexual Harassment Forms
- Responsible Bidder's Affidavit
- Qualifications of Bidder
- Signed Agreement

### RIGHT TO WAIVE INFORMALITIES AND PERMIT CURATIVE MEASURES.

The City reserves the right to waive any Bid informalities. The City may permit bidders who fail to include forms not otherwise required by law to cure such omission(s) within five days of bid opening, in the City's sole discretion.

**Bid Deposits:** Unless otherwise stated, every Bid shall be accompanied by a Bid deposit in the form of an original Bid bond, certified check or a treasurer's, or cashier's check issued by a responsible bank or trust company, payable to the City of Elgin. The Bid bond shall be (a) in a form satisfactory to the City; (b) with a surety company qualified to do business in the state of Illinois and satisfactory to the City; and (c) conditioned upon the faithful performance by the bidder of the terms contained in the Bid. The Bid deposit shall be not less than five percent (5 %) of the value of the Bid.

**Bids Forms.** Each Bid shall be submitted on the Bid form included in the Project Manual. In the case of a conflict between dollar figures and words, written amounts shall control over dollar figures. All blank spaces shall be filled. Any and all blank spaces shall constitute sufficient cause to reject any bid. The Bid form shall be completed in ink or by typewriter.

**Acknowledgment of Addenda.** Each Bidder shall acknowledge the receipt of all Addenda (the numbers of which are to be filled in on the Bid form by the Bidder). A Bidder's failure to acknowledge any Addendum shall constitute sufficient cause for rejection of a bid at the City's sole discretion.

#### **SUBMISSION OF A BID.**

Prior to the deadline for receipt of Bids, each Bid Bond shall be submitted to the Purchasing Department in a sealed envelope which is plainly marked on the outside with the name and address of the Bidder, the title of the Project, and the date and time of the Bid opening no later than **May 9, 2024 at noon CDT.** All Bid submissions must be entered into the City of Elgin's web portal at <https://cityofelgin.ionwave.net/VendorRegistration/PreliminaryInfo.aspx>, no later than **May 9, 2024 at 3:00 pm CDT.** Any Bid received after the deadline shall not be accepted. Any Bid submitted to any other office or department of the City and received by the Purchasing Department after the deadline for receipt of Bids shall not be accepted. It is the responsibility of the Bidder to ensure that its Bid is received by the Purchasing Department in a timely fashion. The deadline for receipt of Bids can be extended by Addendum only.

Bids may not be submitted orally, by facsimile, by telephone, or by any other method except for the method described above.

#### **MODIFICATION OF A BID.**

A Bid may be modified only by submitting any such modification executed in the same manner as a Bid, through the City of Elgin's web portal at <https://cityofelgin.ionwave.net/VendorRegistration/PreliminaryInfo.aspx>. Contact the Purchasing Department for instructions.

#### **WITHDRAWAL OF A BID.**

**Prior to Bid opening.** A Bid may be withdrawn before the time designated for opening Bids. All requests for withdrawal of a bid shall go through the City of Elgin's web portal at <https://cityofelgin.ionwave.net/VendorRegistration/PreliminaryInfo.aspx>. Contact the Purchasing Department for instructions. Withdrawal of a Bid prior to the Bid opening time shall not prejudice the right of a Bidder to resubmit a Bid. A Bid cannot be withdrawn after the Bid opening time except as provided in the Bidding Documents.

**After Bid opening.** In the case of death, disability, clearly apparent clerical error, a Bidder may withdraw its Bid after the time designated for Bid opening, if within five (5) days of the date designated for opening its Bid, such Bidder submits a statement under the penalties of perjury to the Purchasing Department detailing the basis for withdrawal. The City shall then make a determination as to whether

such Bidder shall be permitted to withdraw such bid. Such a determination shall be in the City's sole discretion. In such case, the Bid Deposit shall be returned to the Bidder.

**BID OPENING.**

All Bids received prior to the date and time designated for the Bid opening shall be available on the City's electronic web portal at <https://cityofelgin.ionwave.net/AwardedSourcingEvents.aspx>.

**PUBLIC BID REVIEW AND INSPECTION.**

Upon opening, all Bids become public records except for any portions thereof that are not subject to public disclosure as a matter of law.

Bids may be reviewed by the public in a manner set forth by the Purchasing Department.

Any Bidder who objects to a Bid may protest the Bid. Bid protests shall be governed by Elgin Municipal Code Chapter 5.26.

**LOCAL PURCHASING PREFERENCE:** Bids from responsible and responsive local businesses that do not exceed the lowest bid price from a responsive and responsible nonlocal business by more than two percent (2%) but no more than \$500 for contracts of \$25,000 or less or by more than one percent (1%) but no more than \$2,500 for contracts in excess of \$25,000 shall be awarded to the local businesses. A local business is a business authorized to do business under the laws of the City of Elgin, a business with its principal place of business located within the corporate limits of the City of Elgin, which has the majority of its regular, full-time workforce located within the City of Elgin and is subject to City of Elgin taxes including, but not limited to, sales taxes.

**6. RESERVATION OF RIGHTS TO REJECT BIDS**

The City reserves the right to reject any or all Bids, if it is in the public interest to do so.

The City reserves the right to reject the Bid of any Bidder who, either in its own right or through an affiliation with another entity which the City has determined has not completed a prior project, whether with the City or elsewhere, because of the fault of the Bidder, its Subcontractors or employees; has been declared in default on a prior contract whether with the City or elsewhere; has failed to complete a prior project in a timely fashion whether with the City or elsewhere; based on its work record, is not capable of performing the within Contract whether due to lack of sufficient prior experience, as determined by the City, or any other reason; has a work record of its Subcontractors demanding direct payment from the owner; has a work record of its Subcontractors, employees or material suppliers complaining to the City or other awarding authority regarding the Bidder's failure to pay them; has a record of complaints made to the City or other awarding authority by persons offended by the behavior of the Bidder, its Subcontractors or employees; or has a record of its failure to comply with State of Illinois and/or City laws or requirements. "Work record" or "record" constitutes a minimum of one event in the work history of the Bidder.

The City shall reject every Bid that is not accompanied by a Bid deposit.

**7. AWARD OF CONTRACT**

The City shall award the contract to the lowest responsible (as defined in Elgin Municipal Code Chapter 5.04) and responsive (as defined in Elgin Municipal Code Chapter 5.04) Bidder within 60 days after the date of the opening of the Bids. If the successful Bidder fails to execute a contract in accordance with the terms of its Bid and to furnish all applicable bonds, an award shall be made to the next lowest



responsible and responsive Bidder. The time limit provided above shall not be applicable to a second or subsequent award.

Any Bidder who fails to execute a contract and furnish applicable bonds shall forfeit its Bid deposit which shall become the property of the City. The amount retained by the City shall not exceed the difference between the lowest Bid price and the Bid price of the next lowest responsible and eligible bidder.

The City shall notify the selected Bidder and all other Bidders of the award.

The City shall submit to the selected Bidder a Notice of Award and at least four (4) unsigned copies of the Agreement between the City and the Contractor. The Bidder shall return all executed copies of the Agreement, all bonds and insurance certificates to the City's Purchasing Director within 10 Business Days of the notice of the notice of award.

The selected bidder will be required to furnish a Performance and Payment Bond equal to one hundred percent (100%) of the total contract price in accordance with the provisions stated in the Information for Bidders.

The selected Bidder shall also provide a written substance abuse program that conforms with the requirements of Public Act 095-0635, or a copy of its union contract that establishes a drug/alcohol testing program, prior to the performance of the Work.

Failure of the selected Bidder to submit such documents in a timely fashion as provided above may result in the withdrawal of the award, at the City's discretion. The City shall return one executed copy of the Agreement to the Contractor. Time is of the essence in the performance of the Agreement.

**ALL certified payroll must be submitted with an Application for Payment. All invoices go to City of Elgin Parks and Recreation Department, 100 Symphony Way, Elgin, IL 60120. All certified payroll should be submitted on a flash drive and mailed to City of Elgin Purchasing Department, 150 Dexter Court, Elgin, IL 60120 or emailed on a monthly basis to [denye\\_d@cityofelgin.org](mailto:denye_d@cityofelgin.org).**

## **8. COMPLETION TIME**

The selected Bidder shall commence work not less than 10 days following receipt of a written "Notice to Proceed" and shall substantially complete the project within 15 Months from the date of the Notice to Proceed but not later than September 15, 2025. If any conflict exists between the date provided in the Agreement and these instructions, the Agreement shall prevail. Selected Bidder shall also pay as liquidated damages the sum of **\$1,000** for each calendar day thereafter that the work remains unfinished.

Selected Bidder agrees that such liquidated damages constitute a reasonable, good faith estimate of damages actually incurred by the City and do not constitute a penalty. Such aforementioned liquidated damages shall constitute the sole recourse for the City for violation of this paragraph.

DAINA L. DENYE  
PURCHASING DIRECTOR

**END OF INFORMATION FOR AND INSTRUCTIONS TO BIDDERS**

# AGREEMENT

THIS AGREEMENT is dated this \_\_\_\_\_ day of \_\_\_\_\_, 2024 by and between the City of Elgin, an Illinois Municipal Corporation (herein called "City") and \_\_\_\_\_ (herein called "Contractor"), a *corporation* with a principal place of business at \_\_\_\_\_.

WHEREAS, on April 15, 2024 the City released an Invitation for Bids entitled Elgin Sports Complex Expansion Project

WHEREAS, Contractor submitted a timely bid on May 9, 2024; and

WHEREAS, the City Council has deemed Contractor to be the lowest price responsive and responsible bidder for Elgin Sports Complex Expansion Project hereinafter referred to as "Work";

NOW THEREFORE, in consideration of the mutual promises and covenants herein, the sufficiency of which is hereby acknowledged, the parties hereto hereby agree as follows:

## Article 1. Work.

Contractor shall complete the Work as specified in the Contract Documents.

The Work is generally described as follows:

*The approximate 45-acre site is located at the southwest corner of Rt 20 and Rt 31 in Elgin, IL. The scope of work includes but is not limited to site clearing, earthwork, utilities, electric, communications, roadway and pedestrian paving, synthetic turf athletic fields, fencing, lighting, landscape and irrigation. The project also consists of two new buildings, a restroom concession building and a maintenance building.*

## Article 2. ENGINEER.

The Work has been designed by SmithGroup ("Engineer"). Engineer shall act as City's representative and shall assume and provide such duties and obligations to the extent provided in the Contract Documents.

## Article 3. Work COMPLETION, LIQUIDATED DAMAGES, DELAYS AND DAMAGES.

3.1. Work Completion. The Work shall be completed as provided in the Contract Documents; Substantial Completion is 15 calendar months from the date of the Notice to Proceed and Final Completion not later than September 15, 2025. In the event of any conflict between these dates and dates elsewhere in the Contract Documents, these dates shall prevail. Time is of the essence of this Agreement.

3.2. Liquidated Damages. City and Contractor agree that as reasonable liquidated damages for delay (but not as a penalty) Contractor shall pay City \$1,000 for each day beyond the time specified for Substantial Completion in the Contract Documents. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the times specified in the Contract Documents (hereinafter referred to as "Contract Times") or any proper extension thereof granted by City, Contractor shall pay City \$1,000 for each day beyond the time for Final Completion. Contractor agrees and acknowledges that such liquidated damages constitute a reasonable estimate of City's actual damages. Such liquidated damages shall constitute City's sole recourse for and shall constitute full satisfaction of City's actual damages resulting from Contractor's delay. Contractor further acknowledges and agrees that in the event any provisions in any of the Contract Documents conflict with the provisions of this paragraph or otherwise provide for damages resulting from Contractor's delay, the provisions of this paragraph shall control, and such conflicting provisions and any Contract Documents shall not constitute, and shall not be construed as, a basis by which to render the provisions of this paragraph unenforceable.

3.3. Delays and Damages. In the event Contractor is delayed in the prosecution and completion of the Work or achievement of any Contract Times because of any delays caused by City or Engineer, Contractor shall have no claim against City or Engineer for damages or contract adjustment other than an extension of the Contract Times as provided herein and the waiving of liquidated damages during the period occasioned by the delay.

#### Article 4. CONTRACT PRICE.

City shall pay Contractor \$\_\_\_\_\_ as indicated in the Contractor's Bid for completion of the Work in accordance with the Contract Documents.

#### Article 5. PAYMENTS.

5.1. Payments. City shall make payments on the basis of Contractor's Applications for Payment as recommended by Engineer, in conformance with the City of Elgin's accounts payable schedule. All payments shall be based on the progress of the Work measured by the schedules provided in the Contract Documents. Notwithstanding anything to the contrary in any Contract Documents, City shall be entitled to withhold any payments pending the submission of partial or full waivers of lien and/or certifications verifying the receipt of payment for all work performed by all subcontractors up to the date of Contractor's application for partial or final payment in City's sole discretion. City shall further be entitled to make such payments directly to any subcontractors as may be necessary to obtain such lien waivers and/or certifications. In the event City makes any such payments directly to any subcontractors, the amount of such payments shall be deducted from the total amount due to Contractor pursuant to this agreement; and Contractor shall provide a written release to City in the amount of any such payments upon ten (10) days written demand. Concurrent with all applications for payment, Contractor shall provide City with a sworn certification of all work performed by all subcontractors and amounts paid to all subcontractors as of the date of application.

5.2. Retainage. City may withhold, from all payments prior to Substantial Completion, an amount equal to up to ten percent (10%) of work completed, at City's sole discretion.

Upon Substantial Completion, City may release a portion of the retainage to Contractor, retaining at all times an amount sufficient to cover the cost of the Work remaining to be completed, at City's sole discretion.

The time for payment of any retainage from City to Contractor shall be at City's sole discretion. Such payment shall not be unreasonably withheld.

5.3. Final Payment. The City shall not be required to make final payment prior to completion and acceptance of the Work by the City.

#### Article 6. CONTRACT DOCUMENTS.

There are no Contract Documents other than those listed below. The Contract Documents which comprise the entire agreement between City and Contractor concerning the Work consist of the following:

- a. This Agreement.
- b. Certificates of Insurance.
- c. Bonds.

- d. Notice of Award.
- e. Notice to Proceed.
- f. General Conditions.
- g. Supplementary Conditions.
- h. Specifications.
- i. Drawings consisting of two volumes of drawing sheets, with each sheet volume bearing one of the following general titles: Volume 1 – Site and Volume 2 – Support Facilities.
- j. Any Addenda.
- k. Contractor's Bid.
- l. City Forms.
- m. Any subsequent Written Amendments to any documents listed above and other documents amending, modifying, or supplementing the Contract Documents, which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto.

This Agreement and the Contract Documents listed above comprise the sole and exclusive Agreement between the parties hereto. There are no other agreements between the parties hereto either oral or written, and neither this Agreement nor any Contract Documents shall be modified or amended without the written consent of the authorized representatives of the parties hereto.

#### Article 7. MISCELLANEOUS.

- a. Terms used in this Agreement shall have the meanings indicated in the General Conditions.
- b. No assignment or delegation by a party hereto of any rights under, obligations or interests in the Contract Documents shall be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law); and unless specifically stated to the contrary in any written consent to an assignment, no assignment shall release or discharge the assignor from any duty or responsibility under the Contract Documents.
- c. City and Contractor each binds itself, its partners, successors, employees, assigns, and agents to the other party hereto, its partners, successors, employees, assigns, and agents in respect of all covenants, agreements, and obligations contained in the Contract Documents.
- d. The business address of Contractor is hereby designated as the place to which all notices, letters, and other communication to Contractor shall be mailed or delivered. The address of City is hereby designated as the place to which all notices, letters, and other communication to City shall be mailed or delivered. Such notices, letters and other communications shall be directed to the City's General Services Manager. Either party may change its address at any time by an instrument in writing delivered to Engineer and to the other party.
- e. The terms and provisions of this Agreement shall be severable. In the event any of the terms or provisions of this Agreement shall be deemed to be void or otherwise unenforceable for any reason, the remainder of this Agreement shall remain in full force and effect.

- f. This Agreement shall be subject to and governed by the laws of the State of Illinois. Venue for the resolution of any disputes and the enforcement of any rights arising out of or in connection with the Agreement shall be in the Circuit Court of Kane County, Illinois.
- g. This Agreement shall not be construed so as to create a partnership, joint venture, employment or agency relationship between the parties hereto except as may be specifically provided for herein.
- h. In the event of any conflict between any of the terms or provisions of this Agreement and any other Contract Documents, the terms and provisions of this Agreement shall control.
- i. Indemnification. To the fullest extent permitted by law, Contractor agrees to and shall indemnify, defend and hold harmless the City, the Engineer, Engineer's consultants and the officers, employees, boards and commissions of each and any of them from and against any and all claims, suits, judgments, costs, attorneys' fees, damages or any and all other relief or liability arising out of or resulting from or through, or alleged to arise out of, any acts or negligent acts or omissions of Contractor or Contractor's officers, employees, agents or subcontractors in the performance of this agreement, or arising out of or in connection with litigation based on any mechanic's lien or other claims, suits, judgments and/or demands for damages by subcontractors. In the event of any action against the City, its officers, employees, agents, boards or commissions covered by the foregoing duty to indemnify, defend and hold harmless, such action shall be defended by legal counsel of City's choosing. In the event and to the extent that any legal work is performed by City's in-house legal counsel pursuant to the provisions of this section, City shall be reimbursed by Contractor for such legal work at the rate of \$200 per hour, which rate Contractor hereby agrees and acknowledges to be a reasonable rate for such in-house attorneys' fees. The provisions of this paragraph shall survive any expiration and/or termination of this agreement.
- j. Compliance with Laws. Notwithstanding any other provision of this Agreement, it is expressly agreed and understood that in connection with the performance of this Agreement, \_\_\_\_\_ shall comply with all applicable Federal, State, City and other requirements of law, including, but not limited to, any applicable requirements regarding prevailing wages, minimum wage, workplace safety and legal status of employees. Without limiting the foregoing, \_\_\_\_\_ hereby certifies, represents and warrants to the City that all of \_\_\_\_\_ employees and/or agents who will be providing products and/or services with respect to this Agreement shall be legally authorized to work in the United States. \_\_\_\_\_ shall also, at its expense, secure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, and/or the products and/or services to be provided for in this Agreement. The City shall have the right to audit any records in the possession or control of \_\_\_\_\_ to determine \_\_\_\_\_'s compliance with the provisions of this section. In the event the City proceeds with such an audit, \_\_\_\_\_ shall make available to the City \_\_\_\_\_'s relevant records at no cost to the City. \_\_\_\_\_ shall pay any and all costs associated with any such audit up to the amount of \$900.
- k. Contractor hereby waives any and all claims to interest on money claimed to be due pursuant to this Agreement, and all such rights to interest to which it may otherwise be entitled pursuant to law, including, but not limited to, pursuant to the Local Government Prompt Payment Act, as amended (50 ILCS 505/1, *et.seq*), or the Illinois Interest Act as amended (815 ILCS 205/1, *et.seq*).

- l. Limitation of Actions. Contractor shall not be entitled to and hereby waives, any and all rights that it might have to file suit or bring any cause of action or claim for damages against the City of Elgin and/or its affiliates, officers, employees, agents, attorneys, boards and commissions, of whatsoever nature and in whatsoever forum after two (2) years from the date of this Agreement.
- m. Notwithstanding any other provision hereof, the City may terminate this Agreement at any time for convenience or any other reason upon thirty (30) days prior written notice to \_\_\_\_\_ without penalty. In the event this Agreement is so terminated \_\_\_\_\_ shall be paid for goods provided and/or services actually performed, and reimbursable expenses actually incurred as may be specifically provided for herein prior to such termination, except that such payment and/or reimbursement shall not in any event exceed the total amount set forth for the total contemplated payment provided for herein. Additionally, in the event this Agreement is so terminated, \_\_\_\_\_ shall immediately cease the expenditure of any funds paid to \_\_\_\_\_ by the City and shall refund to the City any unearned or unexpended funds.
- n. This agreement may be executed in counterparts, each of which shall be an original and all of which shall constitute one and the same agreement. For the purposes of executing this agreement, any signed copy of this agreement transmitted by fax machine or e-mail shall be treated in all manners and respects as an original document. The signature of any party on a copy of this agreement transmitted by fax machine or e-mail shall be considered for these purposes as an original signature and shall have the same legal effect as an original signature. Any such faxed or e-mailed copy of this agreement shall be considered to have the same binding legal effect as an original document. At the request of either party any fax or e-mail a copy of this agreement shall be re-executed by the parties in an original form. No party to this agreement shall raise the use of fax machine or e-mail as a defense to this agreement and shall forever waive such defense.

IN WITNESS WHEREOF, City and Contractor have signed this Agreement. One counterpart each has been delivered to City, Contractor, Surety, and Engineer.

This Agreement shall be effective on \_\_\_\_\_.

CONTRACTOR:

CITY: City of Elgin

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

By: Richard G. Kozal

Title: \_\_\_\_\_

Title: City Manager

FEIN # \_\_\_\_\_

Address for giving notices

Address for giving notices

\_\_\_\_\_

City of Elgin

\_\_\_\_\_

150 Dexter Court

\_\_\_\_\_

Elgin, IL 60120

**CITY OF ELGIN, ILLINOIS**

**BID BOND**

We, the undersigned, \_\_\_\_\_ as Principal, and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto the CITY OF ELGIN, a municipality in the State of Illinois, in the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_). We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns. Principal has hereby submitted to the City of Elgin a certain Bid attached hereto and hereby made a part hereof for the Project described as:

**ELGIN SPORTS COMPLEX EXPANSION PROJECT**

If Principal fails to execute a contract and furnish a performance bond and a labor and materials or payment bond as provided for in its bid or otherwise fails to perform any of the obligations created by the acceptance of said bid, Principal's bid deposit shall become and be the property of the City of Elgin as and for reasonable liquidated damages, which shall not be construed as a penalty, but as an actual estimate of damages.

If such Bid is rejected because of death, disability, or clearly apparent clerical error, Principal's bid bond shall be returned to Principal.

Surety, for value received, the sufficiency of which is hereby acknowledged, hereby agrees that its obligations and this bond shall in no way be impaired or affected by an extension of the time in which the City of Elgin may accept such bid and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and have caused this bond to be signed by their proper officers on this \_\_\_\_ day of \_\_\_\_\_, 20\_\_

CONTRACTOR AS PRINCIPAL

SURETY

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name & Title)

\_\_\_\_\_  
(Name & Title)

SEAL

SEAL

**PAYMENT BOND**

We, the undersigned, \_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

\_\_\_\_\_ (Corporation, Partnership or Individual), hereinafter called "Principal", and \_\_\_\_\_

\_\_\_\_\_ (Name of Surety) \_\_\_\_\_  
(Address of Surety)

hereinafter called "Surety", are held and firmly bound unto the CITY OF ELGIN, 150 Dexter Court, Elgin, IL 60120, hereinafter called "Owner", in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_). We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Principal has entered into a certain contract with Owner dated the \_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, a copy of which is attached hereto and made a part hereof, for the project known as :

**PROJECT NAME**

Now, therefore, if Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, and not less than the general prevailing rate of hourly wages of a similar character in the locality in which the work is performed, as determined by the State of Illinois Department of Labor pursuant to the Illinois Compiled Statues 280 ILCS 130 / 1-12 et. seq. including all amounts due for all materials used in connection with the work, and shall promptly make payment for all insurance premiums on said work, and for all labor performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise this bond shall remain in full force and effect.

Surety for value received hereby agrees that no changes, extension of time, alteration or addition to the terms of the contract or to the work to be performed there under or the Specifications accompanying the same shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the contract or to the work or specifications.

Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on this \_\_\_\_\_ day of \_\_\_\_\_, 20

CONTRACTOR AS PRINCIPAL

SURETY

\_\_\_\_\_  
(Signature)  
Name and Title: \_\_\_\_\_

\_\_\_\_\_  
(Signature)  
Name and Title: \_\_\_\_\_

SEAL

SEAL



**PERFORMANCE BOND**

We, the undersigned, \_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

\_\_\_\_\_  
(Corporation, Partnership, or Individual)

hereinafter called "Principal", and \_\_\_\_\_,  
(Name of Surety)

\_\_\_\_\_, (Address of Surety)

hereinafter called "Surety", are held and firmly bound unto the CITY OF ELGIN, 150 Dexter Court, Elgin, IL 60120, hereinafter called "Owner", in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_).

We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Principal has entered into a certain contract with Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy of which is attached hereto and made a part hereof, for the project known as:

**PROJECT NAME**

and Principal and Surety hereby bind themselves to Owner for the performance of the contract.

Now, therefore, if Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by Owner, with or without notice to Surety and during the guaranty period set forth in the contract, and if it shall satisfy all claims, obligations, requirements and demands incurred pursuant to such contract, and shall fully indemnify and save harmless Owner from all costs, damages, suits, causes of action and any and all other liability of whatsoever nature, which it may suffer by reason of Principal's failure to do so, and shall reimburse and repay Owner all outlay and expense which Owner may incur in making good any default, then this obligation shall be void; otherwise, this bond shall remain in full force and effect; provided, further, that the said Surety for value received hereby agrees that no change, extension of time, alteration or addition to the terms of such contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this Bond. Surety hereby waives notice of any such changes, extensions of time, alterations or additions to the terms of such contract or to the work or specifications provided for therein.

Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

CONTRACTOR AS PRINCIPAL

SURETY

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Signature)

Name and Title: \_\_\_\_\_

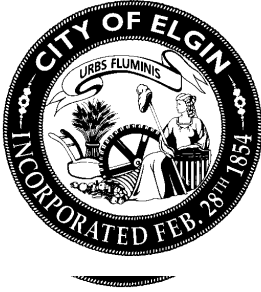
Name and Title: \_\_\_\_\_

\_\_\_\_\_

SEAL

SEAL

'ELGIN  
RESRQP UIDNG  
""'DKFFGT)U'  
'QRDINANCE



## City of Elgin, Illinois Certification Requirements

Please submit all required forms and documentation, fully completed and signed, with your proposal. **No proposal will be accepted without this information.**

1. To assure compliance with the City of Elgin's Affirmative Action Ordinance, all contractors and vendors. Herein referred to as "bidders", are requested to submit the following information:
  - a. Workforce analysis using the enclosed Bidder's Employee Utilization form.
  - b. Provide the information required in Item #3 on the employee utilization form if the answer to Question # 2 on the form is "Yes".
  - c. Provide a written commitment outlining the steps that the bidder plans to take in the area of recruitment and promotion of minorities and females to assure equal employment opportunity. (A copy of the bidder's affirmative action plan may be submitted in lieu of this requirement.)
2. To assure compliance with the City of Elgin's Sexual Harassment Ordinance, all bidders must submit a signed sexual harassment form enclosed with the Invitation to Bid.
3. The undersigned certifies that the offerer is not delinquent in the payment of any tax administered by the Illinois Department of Revenue unless there is a pending proceeding contesting the tax.
4. The undersigned certifies that the offerer is not barred from offering on this solicitation as a result of a conviction for the violation of State law prohibiting bid-rigging or bid-rotating.
5. The successful bidder agrees that upon acceptance by the City of Elgin, the executed Invitation to Bid along with all instructions, conditions, and specifications attached thereto constitute a binding contract which may be enforced by the city.

**Signature / Title** \_\_\_\_\_  
**Company Name** \_\_\_\_\_  
**Address** \_\_\_\_\_

**Phone Number** \_\_\_\_\_  
**Email Address** \_\_\_\_\_  
**FEIN No.** \_\_\_\_\_



## City of Elgin, Illinois

### Equal Employment Written Commitment Guideline

The written commitment required in Item #4 of the Bidder's Employee Utilization Form shall:

1. Set out the name and phone number of the bidder's Equal Employment Officer.
2. Clearly identify the bidder's recruitment area and the percentage of minorities and females in the area's population and labor force.
3. Set out what the bidder has done and has set as a goal to ensure the recruitment of minority and female employees.
4. Set out the bidder's specific goals to recruit minorities and females for training programs or other similar opportunities available through the bidder's organization.
5. Indicate bidder's consent to submit to the City of Elgin, upon request, statistical data concerning its employee composition and recruitment efforts anytime during the term of the contract.
6. Show bidder's consent to distribute copies of the written commitment to all persons who participate in recruitment, screening, referral, and selection and hiring of job applicants for the bidder.
7. Clearly show that the bidder shall require all subcontractors, if any, to submit a written commitment complying with the above requirements of their affirmative action plan to the City of Elgin.
8. Clearly state the bidder agrees that:  
"Bidder (company name) shall not discriminate against any employee or applicant on the basis of race, color, religion, sex, national origin, age, place of birth, ancestry, marital status, or disability (physical or mental) which will not interfere with the performance of the job in question."

#### Description of Groups for Classification Purposes

- African American:** all persons having origins in any of the Black racial groups of Africa
- Asian American:** all persons having origins in the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands
- Caucasian:** all persons having origins in Europe, North America, or the Middle East
- Hispanic:** all persons of Mexican, Puerto Rican, Cuban, Central South American, or other Spanish culture or origin, regardless of race
- Indigenous People:** all persons having origins in any of the original peoples of North America and who maintain cultural identification through tribal affiliation or community recognition



## City of Elgin, Illinois Sexual Harassment - - Policies and Programs

Effective July 1, 1993, every party to any contract with the City of Elgin and every eligible bidder is required to have written sexual harassment policies that include, at a minimum, the following information:

- the illegality of sexual harassment
- the definition of sexual harassment under state law
- a description of sexual harassment, utilizing examples
- a vendor's internal complaint process including penalties and a description of the means by which complaining parties may complain directly to management personnel other than the alleged harassing individual
- the legal recourse, investigative and complaint process available through the Illinois Department of Human Rights, and the Illinois Human Rights Commission
- directions on how to contact the department and commission
- protection against retaliation as provided by Section 6-101 of the Human Rights Act

**I hereby affirm that the organization which I represent has in place sexual harassment policies which include the required information set forth above, and I hereby agree to furnish the City of Elgin - Human Resources Department with a copy of these policies if they so request.**

Signature/Title \_\_\_\_\_  
Company \_\_\_\_\_  
Date \_\_\_\_\_

Sexual harassment is defined as follows:

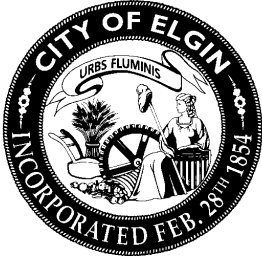
“Sexual harassment” means any unwelcome sexual advances or requests for sexual favors or any conduct of a sexual nature when (1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment, (2) submission to or rejection of such conduct by an individual is used as a basis for employment decisions affecting such individual, or (3) such conduct has the purpose or effect of substantially interfering with an individual's work performance or creating an intimidating, hostile, or offensive working environment.

Any questions by contracting parties or eligible bidders concerning compliance with these requirements should be directed to the City of Elgin - Human Resources Department at (847) 931-

6049.

**The undersigned, on behalf of the undersigned company, hereby agrees to fully indemnify and hold the City of Elgin harmless from any and all liability, loss or damage including costs of defense or claim, demands, costs of judgment against it arising from any complaint based on unlawful harassment and/or employment action, including, but not limited to termination, based on any protected category as provided by law, including, but not limited to, sexual harassment resulting from the act of any member of my organization in the performance of this contract.**

Signature/Title \_\_\_\_\_  
Company \_\_\_\_\_  
Date \_\_\_\_\_



## City of Elgin, Illinois

### BIDDER'S EMPLOYEE UTILIZATION FORM

This report is required by the City of Elgin and must be submitted before the contract can be awarded.  
Chapter 3.12.1000 Affirmative Action - City Contracts

1. Name and Address of Bidder	Description of Project
_____	_____
_____	_____
_____	_____

JOB CATEGORIES	Total Employees	Whites	Blacks	Hispanics	Asians or Pacific Islanders	American Indians	Minority (M & F) %	Female (All Categories) %
		M / F	M / F	M / F	M / F	M / F		
Example: Managers	18	3 / 5	3 / 2	4 / 0	0 / 1	0 / 0	55.6% (10/18)	44.4% (8/18)
<b>TOTALS</b>								

Signature of Company Official	Title	Telephone Number	Date Signed	Page ____ of ____
-------------------------------	-------	------------------	-------------	----------------------

2. Have you ever been awarded a bid by the City of Elgin?  
   \_\_\_ Yes                                   \_\_\_ No
3. If the answer to question #2 is Yes, please submit a copy of the Employee Utilization Form that was submitted with your last successful bid along with a fully completed copy of this form.
4. Please submit, according to the guideline provided in the attached document, a written commitment to provide equal employment opportunity. An Employee Utilization Form is required for any subcontractors.

**NOTE:** In the event that a contractor or vendor, etc., fails to comply with the fair employment and affirmative action provisions of the City of Elgin, the City amongst other actions may cancel, terminate, or suspend the contract in whole or in part.

**CITY OF ELGIN, ILLINOIS  
RESPONSIBLE BIDDER AFFIDAVIT**

State of \_\_\_\_\_ ss.

County of \_\_\_\_\_

\_\_\_\_\_, being first duly sworn, hereby deposes and states:

(1) That s/he is the \_\_\_\_\_ of the party making the bid (the "bidder") of which this affidavit is a part thereof.

(2) That the bidder has a valid federal employer tax identification number, or if an individual, a valid social security number, such number being as follows: \_\_\_\_\_.

(3) That the bidder agrees to and shall comply with the Equal Opportunity Employer provisions of Section 2000e of Chapter 21, Title 42 of the United States Code and Federal Executive Order Number 11246, as amended, by Executive Order 11375, and has and shall comply with the Equal Opportunity Employer provisions of the Elgin Municipal Code, Section 3.12.100, as amended.

(4) That bidder has the insurance coverage as set forth in the bid specifications including general liability, workers' compensation, completed operations, automobile, hazardous occupations and products liability. Copies of certificates of insurance indicating such insurance coverages are attached.

(5) That bidder has a written sexual harassment policy in compliance with the provisions of the Illinois Human Rights Act (775 ILCS 5/2-105(A)(4), as amended). A copy of bidder's written sexual harassment policy is attached.

(6) That bidder hereby certifies that it shall comply with the provisions of the Illinois Prevailing Wage Act (820 ILCS 130/0.01 *et seq.*, as amended).

(7) That the bidder hereby certifies: [check all that apply]

- \_\_\_\_\_ bidder has not received any notices of violations of the Illinois Prevailing Wage Act (820 ILCS 130/0.01 *et seq.*)
- \_\_\_\_\_ in the event any such notice has been received by bidder, a copy of any such notice is attached hereto
- \_\_\_\_\_ in the event that bidder has received such a notice, any documentation demonstrating the resolution of any such notice is attached hereto



- \_\_\_\_\_ for each such notice received by bidder, the matter has been resolved as follows:

---

---

---

(8) As a condition of the agreement for the project, bidder shall have in place a written substance abuse prevention program which meets or exceeds the program requirements of the Substance Abuse Prevention on Public Works Act (820 ILCS 265/1 *et seq.*, as amended). A copy of such policy shall be provided to the city's purchasing director prior to the entry into and execution of the agreement for the project.

(9) Bidder represents and warrants that it has relevant experience that indicates the necessary capacity to perform the project and adequate references verifying the quality of work performed. Relevant experience of the bidder includes the following projects:

---

---

---

---

Bidder's references verifying the quality of the work performed on such projects are as follows:

---

---

---

---

(10) For city construction projects (construction of new city facilities, renovation of an existing facility, or city road construction projects) over fifty thousand dollars (\$50,000) bidder hereby certifies, represents and warrants that it participates in an apprentice and training programs applicable to the work to be performed on the project which are approved by and registered with the United States Department of Labor Office of Apprenticeship and Training or are a reasonable equivalent to such programs. Evidence of such participation is hereby attached:

\_\_\_\_\_ Yes      \_\_\_\_\_ No      \_\_\_\_\_ Not applicable to this project  
(check response which applies)

(11) For city construction projects (construction of new city facilities, renovation of existing facilities or city road construction projects) bidder must demonstrate a good faith effort toward providing equal employment opportunities for persons to work as craftspersons, laborers, workers or mechanics consistent with the racial, ethnic and gender demographics of the labor force available in the Illinois Department of Employment Security Chicago-Naperville-Joliet

Metropolitan Division which consists of Cook DeKalb, DuPage, Grundy, Kane, Kendall, McHenry and Will counties. The following is bidder's description of bidder's good-faith efforts toward providing such equal employment opportunities:

---

---

---

---

---

Signature of bidder, if an individual:

---

Signature of bidder, if a corporation:

---

President

---

Secretary

Signature of bidder, if a partnership:

---

Partner (indicate General or Limited)

Signature of bidder, if a limited liability company:

---

Member or Manager

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

My Commission expires: \_\_\_\_\_

FOR CITY PURCHASING DEPARTMENT ONLY:

Attachments - Insurance certificates: \_\_\_\_\_

Bidder's sexual harassment policy: \_\_\_\_\_

Bidder's substance abuse prevention program: \_\_\_\_\_

If applicable, Illinois Prevailing Wage Act violation notice(s): \_\_\_\_\_

If applicable, documentation resolving IPWA violation notice(s): \_\_\_\_\_

If applicable, apprenticeship and training program documentation: \_\_\_\_\_

Section 1. That Chapter 5.08 of the Elgin Municipal Code, 1976, as amended, entitled "Source Selection; Competitive Sealed Bidding" be and is hereby further amended by adding a new Section 5.08.170 thereto entitled "Construction Contracts-Percentage of City Resident Worker Hours", to read as follows:

- A. "5.08.170 Construction Contracts-Percentage of City Resident Worker Hours: For any city construction contract advertised, or if not advertised, awarded after the effective date of this ordinance having an estimated contract value of \$100,000.00 or more, and where not otherwise prohibited by federal, state or local law, the total hours worked by persons on the site of the construction project by employees of the contract or and subcontractors shall be performed at least ten percent (10%) by actual residents of the City of Elgin.

This minimal percentage of Elgin residents shall not be understood as limiting or deterring the fuller utilization of Elgin residents beyond this level, but is intended instead as a minimal requirement. Contractors shall make good faith efforts to utilize qualified residents of the City of Elgin in unskilled and skilled labor positions. The purchasing director shall separately monitor the utilization of residents of the city in skilled and unskilled positions, and shall report his or her findings to the city manager and the city council when substantially all of the construction contracts for each construction season have been closed. The purchasing director shall also report whether he or she has determined that separate minimum percentages of Elgin residents are warranted for skilled and unskilled labor positions.

A waiver or reduction shall be deemed appropriate if a contractor or subcontractor has unsuccessfully solicited a sufficient number of residents of the City of Elgin to perform the work identified in the bid solicitation and has documented such effort to the satisfaction of the purchasing director. In addition, such standards and procedures shall require that a contractor seeking a waiver or reduction shall have provided timely notice of the need for qualified residents of the City of Elgin to an appropriate source of referrals, which source shall be entitled to comment on any waiver or reduction application. If the purchasing director determines that a lesser percentage standard is appropriate with respect to a particular contract subject to competitive bidding prior to the bid solicitations for such contract, such bid solicitations shall include a statement of such revised standards. The purchasing director shall file annual reports of his or her determinations on all reduction or waiver requests made pursuant to this paragraph with the city manager and the city council.

- B. Implementation of the requirements established in subsection A of this section will be achieved by including in contracts and subcontracts described therein the following language: The contractor and all subcontractors that perform work on the site on the construction project undertaken pursuant to this contract shall comply with the minimum percentage of total worker hours performed by actual residents of the City of Elgin as specified in Section 5.08.170 of the Elgin Municipal Code.

"Actual residents of the City of Elgin" shall mean persons domiciled within the corporate city limits of the City of Elgin. The domicile is an individual's one and only true, fixed and permanent home and principal residence which has not been adopted with the intention of again taking up or claiming a previous residence outside the corporate city limits of the City of Elgin.

The contractor shall provide for the maintenance of adequate employee residency records to ensure that actual Elgin residents are employed on the project. The contractor and subcontractors shall maintain copies of personal documents supportive of every Elgin employee's actual record of residence. Weekly certified payroll reports (U.S. Department of Labor Form WH-347 or equivalent) submitted to the head of the using department in triplicate, shall identify clearly the actual residence of every employee on each submitted certified payroll. The first time that an employee's name appears on a payroll, the date that the company hired the employee should be written in after the employee's name.

Full access to the contractor's and subcontractor's employment record shall be granted to the purchasing director, the head of the using department, the corporation counsel, the professional standards officer, or any duly authorized representative thereof. The contractor and subcontractors shall maintain all relevant personnel data in records for a period of at least three years after final acceptance of the work.

At the direction of the using department, affidavits and other supporting documentation will be required of the contractor to verify or clarify an employee's actual address when doubt or lack of clarity has arisen.

Good faith efforts on the part of the contractor to provide utilization of actual Elgin residents shall not suffice to replace the actual, verified achievement of the requirements of this section concerning the worker hours performed by actual Elgin residents.

When work is completed, in the event that the city has determined that the contractor failed to ensure the fulfillment of the requirement of this section concerning the worker hours performed by actual Elgin residents or has failed to report in the manner as indicated above, the city will thereby be damaged in the failure to provide the benefit of demonstrable employment to Elgin residents to the degree stipulated in this section. Therefore, in such a case of non-compliance it is agreed that 1/10 of 1 percent (.01%), 0.001, of the approved contract value for the subject contract shall be surrendered by the contractor to the city in payment for each percentage of shortfall to ward the stipulated residency requirement. Failure to report the residency of employees entirely and correctly shall result in the surrender of the entire liquidated damages as if no Elgin residents were employed in either of the categories. The willful falsification of statements and the certification of payroll data may subject the contractor or subcontractors or employee to prosecution. Any retainage to cover contract performance that may become due to the contractor may be withheld by the city pending the purchasing director's determination whether the contractor must surrender damages as provided in this paragraph.

Nothing herein provided shall be construed to be a limitation upon the "Notice of Requirements for Affirmative Action to Ensure Equal Employment Opportunity, Executive Order 11246" and "Standard Federal Equal Employment Opportunity, Executive Order 11246", or other affirmative action required for equal opportunity under the provisions of the subject contract.

- C. In addition to assessing the monetary damages stipulated in subsection B hereof, the purchasing director may, in lieu of declaring the contractor to be a non-responsible bidder, require the contractor to post a surety bond or other appropriate security in an amount

representing ten percent of the approved contract value for subsequent contracts on which the contractor bids, which the contractor shall agree to forfeit in its entirety in the event that full compliance with the requirements of this is not achieved during the performance of any future contract that the contractor enters with the City of Elgin.

- D. Any person who is employed in a construction project subject to the provisions of this section who knowingly supplies false information concerning his or her residence shall be subject to a fine of not less than \$500.00 for each offense. Any person found to have violated this section shall also be barred from employment on any construction project subject to this section for a period of five years."

Section 2. That Chapter 5.08 of the Elgin Municipal Code, 1976, as amended, entitled "Source Selection; Competitive Sealed Bidding" be and is hereby further amended by adding a new Section 5.08.180 thereto entitled "Construction Contracts-Apprentice Utilization", to read as follows:

"5.08.180: Construction Contracts-Bid Incentive For Apprentice Utilization:

- A. For purposes of this section only the following definitions apply:

"Apprentice" means any person who is sponsored into an apprenticeship training program by a contractor and who is an actual resident of the City of Elgin as defined in Section 5.08.170. The contractor's apprenticeship training program must be approved by and registered with the United States Department of Labor, Office of Apprenticeship and Training Programs, or be reasonably equivalent to such programs.

"Bid incentive" means an amount deducted, for bid evaluation purposes only, from the total bid price that is attributable to labor costs, in order to calculate the bid price to be used to evaluate the bid on a competitively bid construction project.

"Earned credit" means the amount of the bid incentive allocated to a contractor upon completion of a construction project in which the contractor met or exceeded his or her goals for the utilization of apprentices in performance of the total labor hours performed under the contract.

"Earned credit certificate" means a certificate issued by the purchasing director evidencing the amount of earned credit a contractor has been awarded.

"Labor hours" means the total hours of workers receiving an hourly wage who are directly employed at the work site. "Labor hours" shall include hours performed by workers employed by the contractor and all subcontractors working at the work site. "Labor hours" shall not include hours worked by non-working foremen, superintendents, owners and workers who are not subject to prevailing wage requirements.

- B. 1. For any city construction contract advertised after the effective date of this ordinance having an estimated contract value of \$100,000.00 or more, and where not otherwise prohibited by federal, state or local law, the purchasing director shall allocate to any qualified bidder the

following bid incentive for utilization of apprentices in performance of the total labor hours performed under contract.

<i>C. Total Labor Hours Performed by Apprentices</i>	<i>Bid</i>	<i>Incentive</i>
5 to 10%	½%	of bid price
11 to 15%	1%	of bid price

The bid incentive shall be calculated and applied in accordance with the provisions of subsection B2. The bid incentive is used only to calculate an amount to be used in evaluating the bid. The bid incentive does not affect the contract price.

2. Upon the completion of a contract subject to this section, a contractor may apply to the purchasing director for earned credits if the contractor met or exceeded his or her apprentice utilization goals established in the contract. If the purchasing director determines that the contractor has successfully met his or her apprentice utilization goals, the purchasing director shall issue an earned credit certificate that evidences the amount of earned credits allocated to the contractor. The contractor may apply the earned credits as the bid incentive for any future construction project, contract bid of equal or greater dollar value.

The earned credit certificate is valid for twelve months from the date of issuance and shall not be applied towards any future contract bid after the expiration of that period.

C. The contractor shall maintain accurate and detailed books and records necessary to monitor compliance with this section and shall submit such reports as required by the purchasing director or the head of the using department.

Full access to the contractor's and subcontractor's records shall be granted to the purchasing director, the head of the using department, the corporation counsel, the professional standards officer, or any duly authorized representative thereof. The contractor and subcontractors shall maintain all relevant records for a period of at least three years after final acceptance of the work.

D. The purchasing director is authorized to adopt, promulgate and enforce reasonable rules and regulations pertaining to the administration and enforcement of this section."

Section 3. That all ordinances or parts of ordinances in conflict with the provisions of this ordinance be and are hereby repealed to the extent of any such conflict.

Section 4. That this ordinance shall be in full force and effect upon its passage and publication from and after April 1, 2013.

## Workforce Availability Information



**Table I**

**Elgin Metro Division**

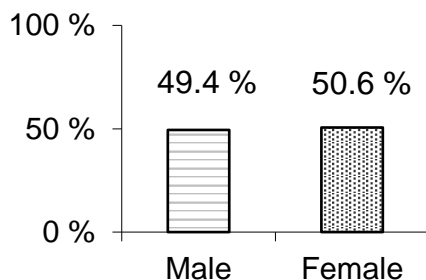
**Population by Sex and Race & Ethnicity**

	Total		Male		Female	
	Number	Percent *	Number	Percent *	Number	Percent *
<b>Total Population</b>	<b>207,336</b>	<b>100 %</b>	<b>102,445</b>	<b>49.4 %</b>	<b>104,891</b>	<b>50.6 %</b>
<b>One Race, Any Ethnicity **</b>						
White Alone	172,637	<b>83.3 %</b>	84,127	<b>40.6 %</b>	88,510	<b>42.7 %</b>
Black or African American Alone	15,947	<b>7.7 %</b>	8,325	<b>4.0 %</b>	7,622	<b>3.7 %</b>
Asian & Pac. Is.	4,010	<b>1.9 %</b>	2,114	<b>1.0 %</b>	1,896	<b>0.9 %</b>
Native American	696	<b>0.3 %</b>	332	<b>0.2 %</b>	364	<b>0.2 %</b>
Other	5,447	<b>2.6 %</b>	3,105	<b>1.5 %</b>	2,342	<b>1.1 %</b>
<b>Two or More Races, Any Ethnicity **</b>	<b>8,599</b>	<b>4.1 %</b>	<b>4,442</b>	<b>2.1 %</b>	<b>4,157</b>	<b>2.0 %</b>
<b>Hispanic, Any Race</b>	<b>21,912</b>	<b>10.6 %</b>	<b>11,028</b>	<b>5.3 %</b>	<b>10,884</b>	<b>5.2 %</b>

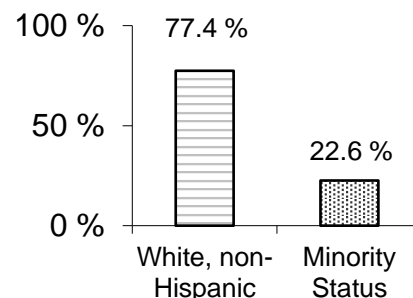
  

<b>Total Population</b>	<b>207,336</b>	<b>100 %</b>	<b>102,445</b>	<b>49.4 %</b>	<b>104,891</b>	<b>50.6 %</b>
White, non-Hispanic	160,544	<b>77.4 %</b>	78,458	<b>37.8 %</b>	82,086	<b>39.6 %</b>
All Others, including Hispanic	46,792	<b>22.6 %</b>	23,987	<b>11.6 %</b>	22,805	<b>11.0 %</b>

**Population by Gender**



**Population by Race & Ethnicity**



**Source:** US Census Bureau, 2020 American Community Survey (ACS), 5-Year Estimates

Tables B01001, B01001A, B01002A, B01002B, B01002C, B01002D, B01002E, B01002F, B01002G, B01002H & B01002I

\* Percent of Total Population \*\* Includes the ethnic group Hispanic

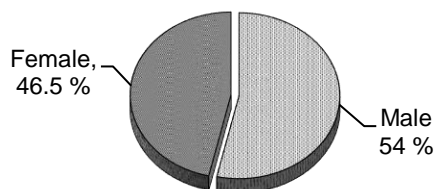


### Elgin Metro Division Labor Force by Sex and Race & Ethnicity

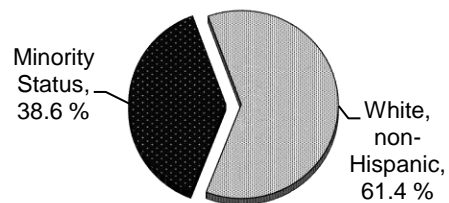
	Number of People					
	Total		Male		Female	
	Number	Percent *	Number	Percent *	Number	Percent *
<b>Total Civilian Labor Force, Aged 16+</b>	<b>342,764</b>	<b>100 %</b>	<b>183,532</b>	<b>53.5 %</b>	<b>159,232</b>	<b>46.5 %</b>
<b>One Race, Any Ethnicity **</b>						
White Alone	252,887	73.8 %	134,396	39.2 %	118,491	34.6 %
Black or African American Alone	18,578	5.4 %	8,965	2.6 %	9,613	2.8 %
Asian & Pac. Is.	12,658	3.7 %	6,656	1.9 %	6,002	1.8 %
Native American	1,721	0.5 %	967	0.3 %	754	0.2 %
Other	39,865	11.6 %	23,350	6.8 %	16,515	4.8 %
<b>Two or More Races, Any Ethnicity **</b>	17,055	5.0 %	9,198	2.7 %	7,857	2.3 %
<b>Hispanic, Any Race</b>	94,749	27.6 %	53,652	15.7 %	41,097	12.0 %

<b>Total Civilian Labor Force, Aged 16+</b>	<b>342,764</b>	<b>100 %</b>	<b>183,532</b>	<b>53.5 %</b>	<b>159,232</b>	<b>46.5 %</b>
White, non-Hispanic	210,589	61.4 %	110,864	32.3 %	99,725	29.1 %
All Others, including Hispanic	132,175	38.6 %	72,668	21.2 %	59,507	17.4 %

Labor Force by Gender



Labor Force by Race & Ethnicity



**Source:** US Census Bureau, 2020 American Community Survey (ACS), 5-Year Estimates  
Tables C23002A, C23002B, C23002C, C23002D, C23002E, C23002F, C23002G, C23002H & C23002I

\* Percent of Total Labor Force \*\* Includes the ethnic group Hispanic

Table III

EEO Occupational Groups by Sex and Race/Ethnicity for Civilian Labor Force 16 Years and Over						
Elgin Metro Division	Total, race and ethnicity	Hispanic or Latino	Not Hispanic or Latino, one race			Balance of not Hispanic or Latino
			White alone	Black or African American alone	Other Races	
<b>Management, Business and Financial Workers</b>						
<b>Total, both sexes</b>						
Number	46,215	4,930	36,990	1,870	1,865	570
Percent	100 %	10.7 %	80.0 %	4.0 %	4.0 %	1.2 %
<b>Male</b>						
Number	28,650	3,015	23,380	950	1,005	305
Percent	62.0 %	6.5 %	50.6 %	2.1 %	2.2 %	0.7 %
<b>Female</b>						
Number	17,565	1,915	13,605	930	850	265
Percent	38.0 %	4.1 %	29.4 %	2.0 %	1.8 %	0.6 %
<b>Science, Engineering and Computer Professionals</b>						
<b>Total, both sexes</b>						
Number	10,820	840	8,085	370	1,359	165
Percent	100 %	7.8 %	74.7 %	3.4 %	12.6 %	1.5 %
<b>Male</b>						
Number	8,575	675	6,575	225	969	119
Percent	79.3 %	6.2 %	60.8 %	2.1 %	9.0 %	1.1 %
<b>Female</b>						
Number	2,245	165	1,510	145	385	45
Percent	20.7 %	1.5 %	14.0 %	1.3 %	3.6 %	0.4 %
<b>Healthcare Practitioner Professionals</b>						
<b>Total, both sexes</b>						
Number	9,805	575	7,615	314	1,255	50
Percent	100 %	5.9 %	77.7 %	3.2 %	12.8 %	0.5 %
<b>Male</b>						
Number	2,005	105	1,425	4	435	40
Percent	20.4 %	1.1 %	14.5 %	0.0 %	4.4 %	0.4 %
<b>Female</b>						
Number	7,800	470	6,185	314	820	10
Percent	79.6 %	4.8 %	63.1 %	3.2 %	8.4 %	0.1 %
<b>Other Professional Workers</b>						
<b>Total, both sexes</b>						
Number	32,860	2,450	26,990	1,335	1,794	290
Percent	100 %	7.5 %	82.1 %	4.1 %	5.5 %	0.9 %
<b>Male</b>						
Number	13,470	870	10,910	615	894	185
Percent	41.0 %	2.6 %	33.2 %	1.9 %	2.7 %	0.6 %
<b>Female</b>						
Number	19,385	1,585	16,080	720	904	100
Percent	59.0 %	4.8 %	48.9 %	2.2 %	2.8 %	0.3 %
<b>Technicians</b>						
<b>Total, both sexes</b>						
Number	7,355	1,710	4,975	325	259	84
Percent	100 %	23.2 %	67.6 %	4.4 %	3.5 %	1.1 %
<b>Male</b>						
Number	3,205	765	2,015	230	140	50
Percent	43.6 %	10.4 %	27.4 %	3.1 %	1.9 %	0.7 %
<b>Female</b>						
Number	4,155	945	2,960	95	119	34
Percent	56.5 %	12.8 %	40.2 %	1.3 %	1.6 %	0.5 %

Table III

EEO Occupational Groups by Sex and Race/Ethnicity for Civilian Labor Force 16 Years and Over						
Elgin Metro Division	Total, race and ethnicity	Hispanic or Latino	Not Hispanic or Latino, one race			Balance of not Hispanic or Latino
			White alone	Black or African American alone	Other Races	
<b>Sales Workers</b>						
<b>Total, both sexes</b>						
Number	37,835	7,585	26,415	1,840	1,285	695
Percent	100 %	20.0 %	69.8 %	4.9 %	3.4 %	1.8 %
<b>Male</b>						
Number	19,325	3,125	14,685	645	670	200
Percent	51.1 %	8.3 %	38.8 %	1.7 %	1.8 %	0.5 %
<b>Female</b>						
Number	18,505	4,465	11,730	1,195	619	495
Percent	48.9 %	11.8 %	31.0 %	3.2 %	1.6 %	1.3 %
<b>Administrative Support Workers</b>						
<b>Total, both sexes</b>						
Number	42,885	9,760	28,595	2,565	1,535	430
Percent	100 %	22.8 %	66.7 %	6.0 %	3.6 %	1.0 %
<b>Male</b>						
Number	10,235	2,880	5,910	730	660	55
Percent	23.9 %	6.7 %	13.8 %	1.7 %	1.5 %	0.1 %
<b>Female</b>						
Number	32,650	6,880	22,685	1,840	875	375
Percent	76.1 %	16.0 %	52.9 %	4.3 %	2.0 %	0.9 %
<b>Construction and Extractive Craft Workers</b>						
<b>Total, both sexes</b>						
Number	15,750	7,010	8,485	160	25	75
Percent	100 %	44.5 %	53.9 %	1.0 %	0.2 %	0.5 %
<b>Male</b>						
Number	15,275	6,755	8,275	160	25	64
Percent	97.0 %	42.9 %	52.5 %	1.0 %	0.2 %	0.4 %
<b>Female</b>						
Number	475	254	205	4	0	15
Percent	3.0 %	1.6 %	1.3 %	0.0 %	0.0 %	0.1 %
<b>Installation, Maintenance and Repair Craft Workers</b>						
<b>Total, both sexes</b>						
Number	9,720	2,765	6,515	125	224	90
Percent	100 %	28.4 %	67.0 %	1.3 %	2.3 %	0.9 %
<b>Male</b>						
Number	9,510	2,635	6,435	125	224	90
Percent	97.8 %	27.1 %	66.2 %	1.3 %	2.3 %	0.9 %
<b>Female</b>						
Number	205	130	75	0	0	0
Percent	2.1 %	1.3 %	0.8 %	0.0 %	0.0 %	0.0 %
<b>Production Operative Workers</b>						
<b>Total, both sexes</b>						
Number	26,760	15,095	9,220	1,070	1,030	355
Percent	100 %	56.4 %	34.5 %	4.0 %	3.8 %	1.3 %
<b>Male</b>						
Number	17,820	9,135	7,070	725	650	255
Percent	66.6 %	34.1 %	26.4 %	2.7 %	2.4 %	1.0 %
<b>Female</b>						
Number	8,945	5,960	2,155	345	380	105
Percent	33.4 %	22.3 %	8.1 %	1.3 %	1.4 %	0.4 %

Table III

EEO Occupational Groups by Sex and Race/Ethnicity for Civilian Labor Force 16 Years and Over						
Elgin Metro Division	Total, race and ethnicity	Hispanic or Latino	Not Hispanic or Latino, one race			Balance of not Hispanic or Latino
			White alone	Black or African American alone	Other Races	
<b>Transportation and Material Moving Operative Workers</b>						
<b>Total, both sexes</b>						
Number	15,450	4,820	8,575	1,540	329	179
Percent	100 %	31.2 %	55.5 %	10.0 %	2.1 %	1.2 %
<b>Male</b>						
Number	13,010	4,280	6,990	1,325	244	164
Percent	84.2 %	27.7 %	45.2 %	8.6 %	1.6 %	1.1 %
<b>Female</b>						
Number	2,440	534	1,585	215	80	15
Percent	15.8 %	3.5 %	10.3 %	1.4 %	0.5 %	0.1 %
<b>Laborers and Helpers</b>						
<b>Total, both sexes</b>						
Number	22,555	11,425	8,395	1,960	589	180
Percent	100 %	50.7 %	37.2 %	8.7 %	2.6 %	0.8 %
<b>Male</b>						
Number	16,305	8,090	6,540	1,235	320	109
Percent	72.3 %	35.9 %	29.0 %	5.5 %	1.4 %	0.5 %
<b>Female</b>						
Number	6,250	3,335	1,855	720	269	65
Percent	27.7 %	14.8 %	8.2 %	3.2 %	1.2 %	0.3 %
<b>Protective Service Workers</b>						
<b>Total, both sexes</b>						
Number	5,970	985	4,335	460	104	85
Percent	100 %	16.5 %	72.6 %	7.7 %	1.7 %	1.4 %
<b>Male</b>						
Number	4,475	690	3,425	175	104	85
Percent	75.0 %	11.6 %	57.4 %	2.9 %	1.7 %	1.4 %
<b>Female</b>						
Number	1,500	295	920	285	0	0
Percent	25.1 %	4.9 %	15.4 %	4.8 %	0.0 %	0.0 %
<b>Service Workers, Except Protective</b>						
<b>Total, both sexes</b>						
Number	51,210	18,180	26,850	3,595	1,774	815
Percent	100 %	35.5 %	52.4 %	7.0 %	3.5 %	1.6 %
<b>Male</b>						
Number	18,445	7,680	8,710	1,230	524	305
Percent	36.0 %	15.0 %	17.0 %	2.4 %	1.0 %	0.6 %
<b>Female</b>						
Number	32,765	10,495	18,145	2,360	1,250	505
Percent	64.0 %	20.5 %	35.4 %	4.6 %	2.4 %	1.0 %

Source: 2014-2018 ACS 5-Year EEO Estimates , Table: EEO-ALL03R  
<https://www.census.gov/acs/www/data/eo-data/eo-tables-2018/>

## Daina DeNye

---

**From:** William Cogley  
**Sent:** Friday, November 15, 2019 9:43 AM  
**To:** Daina DeNye; Mike Gehrman; Christopher Beck; Rick Kozal  
**Subject:** Public Act 100-1177-Amendments to the Prevailing Wage Act  
**Attachments:** 100-1177.pdf

Attached is a copy of Public Act 100-1177 which was effective June 1, 2019. The act provides for various amendments to the prevailing wage act with the amendments being noted by underlining and strikethroughs. Most notable are the provisions relating to reports to be prepared by the Department of Labor, that only the Department of Labor and not local communities will annually ascertain the prevailing wage rates, and the new database to be created by the Department of Labor for certified payrolls.

Bill

William A. Cogley  
Corporation Counsel  
City of Elgin  
150 Dexter Court  
Elgin, IL 60120-5555  
847-931-5659  
847-931-5665(facsimile)  
cogley\_w@cityofelgin.org

RESOLUTION  
ESTABLISHING PREVAILING WAGE RATES ON PUBLIC WORKS CONTRACTS

WHEREAS, 820 ILCS 130/0.01 et seq. entitled "AN ACT regulating wages of laborers, mechanics, and other workers employed in any public works by the State, county, city or any public body or any political subdivision or by anyone under contract for public works, (the "Prevailing Wage Act")" requires that any public body awarding any contract for public work, or otherwise undertaking any public works as defined herein, shall ascertain the general prevailing hourly rate of wages for employees engaged in such work; and

WHEREAS, the Illinois Department of Labor has determined the prevailing rate of wages for construction work in Cook and Kane Counties in the State of Illinois.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ELGIN, ILLINOIS, that the most recent determination of the prevailing wages as made by the Illinois Department of Labor of August 2018, copies of which are attached hereto and made a part hereof by reference, are adopted by the City of Elgin. It shall be the obligation of any entity or person who is required to pay the prevailing hourly rate of wages pursuant to the Prevailing Wage Act to pay the prevailing wages in effect at that time as then most recently determined by the Illinois Department of Labor.

BE IT FURTHER RESOLVED that all contracts for public work of the City of Elgin shall include a stipulation to the effect that not less than the prevailing rate of wages as found by the Illinois Department of Labor shall be paid to all laborers, workers and mechanics performing work under the contract.

BE IT FURTHER RESOLVED that all contract bonds for public works shall include a provision to guarantee the faithful performance of the prevailing wage clause as provided by contract.

BE IT FURTHER RESOLVED that a copy of the prevailing wage rate as established by the Illinois Department of Labor shall be publicly posted and kept available for inspection by any interested party.

BE IT FURTHER RESOLVED that nothing herein contained shall be construed to apply to the prevailing hourly rate of wages in the locality for employment other than public works construction as defined in the Act, and that the City Clerk be and is hereby authorized to file a certified copy of this resolution with the Secretary of State Index Division and the Department of Labor of the State of Illinois.

---

David J. Kaptain, Mayor

Presented: September 12, 2018

Adopted:

Vote: Yeas    Nays:

Recorded:

Attest:

---

Kimberly A. Dewis, City Clerk

## Kane County Prevailing Wage Rates posted on 3/19/2024

Trade Title	Rg	Type	C	Base	Foreman	Overtime					Pension	Vac	Trng	Other Ins	Add OT 1.5x owed	Add OT 2.0x owed
						M-F	Sa	Su	Hol	H/W						
ASBESTOS ABT-GEN	All	ALL		48.90	49.90	1.5	1.5	2.0	2.0	15.28	18.00	0.00	0.91		0.00	0.00
ASBESTOS ABT-MEC	All	BLD		40.59	43.84	1.5	1.5	2.0	2.0	15.22	15.16	0.00	0.88		2.80	5.60
BOILERMAKER	All	BLD		54.71	59.63	2.0	2.0	2.0	2.0	6.97	25.06	0.00	2.83		0.00	0.00
BRICK MASON	All	BLD		50.81	55.89	1.5	1.5	2.0	2.0	12.50	23.01	0.00	1.16	0.00	0.00	0.00
CARPENTER	All	ALL		53.51	55.51	1.5	1.5	2.0	2.0	12.29	25.77	1.20	0.81		0.00	0.00
CEMENT MASON	All	ALL		50.70	52.70	2.0	1.5	2.0	2.0	11.89	27.82	0.00	0.80	0.00	0.00	0.00
CERAMIC TILE FINISHER	All	BLD		45.62	45.62	1.5	1.5	2.0	2.0	12.75	15.64	0.00	1.04	0.00	0.00	0.00
CERAMIC TILE LAYER	All	BLD		53.14	58.14	1.5	1.5	2.0	2.0	12.75	19.41	0.00	1.12	0.00	0.00	0.00
COMMUNICATION TECHNICIAN	N	BLD		45.48	47.88	1.5	1.5	2.0	2.0	14.37	18.21	0.00	0.91	0.00	0.00	0.00
COMMUNICATION TECHNICIAN	S	BLD		44.15	46.95	1.5	1.5	2.0	2.0	17.30	16.36	0.00	1.54	0.00	0.00	0.00
ELECTRIC PWR EQMT OP	All	ALL		49.22	67.16	1.5	1.5	2.0	2.0	7.00	13.79	0.00	1.47	1.48	0.00	0.00
ELECTRIC PWR GRNDMAN	All	ALL		37.81	67.16	1.5	1.5	2.0	2.0	7.00	10.58	0.00	1.14	1.13	0.00	0.00
ELECTRIC PWR LINEMAN	All	ALL		59.17	67.16	1.5	1.5	2.0	2.0	7.00	16.57	0.00	1.77	1.78	0.00	0.00
ELECTRIC PWR TRK DRV	All	ALL		39.19	67.16	1.5	1.5	2.0	2.0	7.00	10.98	0.00	1.17	1.18	0.00	0.00
ELECTRICIAN	N	ALL		54.61	59.01	1.5	1.5	2.0	2.0	16.24	21.75	0.00	1.64	0.00	0.00	0.00
ELECTRICIAN	S	BLD		53.32	57.57	1.5	1.5	2.0	2.0	18.05	19.93	0.00	1.87	0.00	0.00	0.00
ELEVATOR CONSTRUCTOR	All	BLD		65.12	73.26	2.0	2.0	2.0	2.0	16.08	20.56	5.20	0.70		0.00	0.00
FENCE ERECTOR	All	ALL		47.12	52.77	1.5	1.5	1.5	1.5	13.06	25.13	0.00	0.00	0.00	0.00	0.00
GLAZIER	All	BLD		49.75	51.25	1.5	2.0	2.0	2.0	15.44	25.36	0.00	2.07	0.00	0.00	0.00
HEAT/FROST INSULATOR	All	BLD		54.12	57.37	1.5	1.5	2.0	2.0	15.22	17.86	0.00	0.88		4.15	8.30
IRON WORKER	All	ALL		51.99	58.23	2.0	2.0	2.0	2.0	13.06	29.22	0.00	1.80	0.00	0.00	0.00
LABORER	All	ALL		48.90	49.65	1.5	1.5	2.0	2.0	15.28	18.00	0.00	0.91		0.00	0.00
LATHER	All	ALL		53.51	55.51	1.5	1.5	2.0	2.0	12.29	25.77	1.20	0.81		0.00	0.00
MACHINIST	All	BLD		55.74	59.74	1.5	1.5	2.0	2.0	9.93	8.95	1.85	1.47		0.00	0.00
MARBLE FINISHER	All	ALL		38.75	52.46	1.5	1.5	2.0	2.0	12.50	20.95	0.00	0.66	0.00	0.00	0.00
MARBLE SETTER	All	BLD		49.96	54.96	1.5	1.5	2.0	2.0	12.50	22.31	0.00	0.85	0.00	0.00	0.00



## Kane County Prevailing Wage Rates posted on 3/19/2024

MATERIAL TESTER I	All	ALL		38.90		1.5	1.5	2.0	2.0	15.28	18.00	0.00	0.91		0.00	0.00
MATERIALS TESTER II	All	ALL		43.90		1.5	1.5	2.0	2.0	15.28	18.00	0.00	0.91		0.00	0.00
MILLWRIGHT	All	ALL		53.51	55.51	1.5	1.5	2.0	2.0	12.29	25.77	1.20	0.81		0.00	0.00
OPERATING ENGINEER	All	BLD	1	56.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	2	55.30	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	3	52.75	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	4	51.00	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	5	60.35	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	6	57.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	7	59.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT		41.00	41.00	1.5	1.5	2.0	2.0	20.90	17.85	2.00	2.15		0.00	0.00
OPERATING ENGINEER	All	HWY	1	54.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	2	54.25	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	3	52.20	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	4	50.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	5	49.60	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	6	57.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	7	55.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
ORNAMENTAL IRON WORKER	E	ALL		55.01	57.51	2.0	2.0	2.0	2.0	14.23	26.00	0.00	2.00	0.00	0.00	0.00
PAINTER	All	ALL		51.55	53.55	1.5	1.5	1.5	2.0	17.98	7.15	0.00	1.55	0.00	0.00	0.00
PAINTER - SIGNS	All	BLD		45.49	51.09	1.5	1.5	2.0	2.0	8.20	16.81	0.00	0.00	0.00	0.00	0.00
PILEDRIIVER	All	ALL		53.51	55.51	1.5	1.5	2.0	2.0	12.29	25.77	1.20	0.81		0.00	0.00
PIPEFITTER	All	BLD		55.00	58.00	1.5	1.5	2.0	2.0	12.65	22.85	0.00	3.12	0.00	0.00	0.00
PLASTERER	All	BLD		48.75	51.68	1.5	1.5	2.0	2.0	17.33	20.33	0.00	1.15	0.00	0.00	0.00
PLUMBER	All	BLD		56.80	60.20	1.5	1.5	2.0	2.0	17.00	17.29	0.00	1.73		0.00	0.00
ROOFER	All	BLD		49.25	54.25	1.5	1.5	2.0	2.0	11.83	16.14	0.00	1.11	0.00	0.00	0.00
SHEETMETAL WORKER	All	BLD		54.25	56.96	1.5	1.5	2.0	2.0	13.60	19.43	0.00	1.59	2.62	0.00	0.00
SPRINKLER FITTER	All	BLD		56.60	59.35	1.5	1.5	2.0	2.0	14.45	18.80	0.00	0.75	0.00	0.00	0.00
STONE MASON	All	BLD		50.81	55.89	1.5	1.5	2.0	2.0	12.50	23.01	0.00	1.16	0.00	0.00	0.00

## Kane County Prevailing Wage Rates posted on 3/19/2024

TERRAZZO FINISHER	All	BLD		46.94	46.94	1.5	1.5	2.0	2.0	12.75	17.73	0.00	1.07	0.00	0.00	0.00
TERRAZZO MECHANIC	All	BLD		50.85	54.35	1.5	1.5	2.0	2.0	12.75	19.12	0.00	1.10	0.00	0.00	0.00
TRAFFIC SAFETY WORKER I	All	HWY		40.10	41.70	1.5	1.5	2.0	2.0	10.60	9.35	0.00	1.00	0.00	0.00	0.00
TRAFFIC SAFETY WORKER II	ALL	HWY		41.10	42.70	1.5	1.5	2.0	2.0	10.60	9.35	0.00	1.00	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	1	42.76	43.31	1.5	1.5	2.0	2.0	11.33	14.75	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	2	42.91	43.31	1.5	1.5	2.0	2.0	11.33	14.75	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	3	43.11	43.31	1.5	1.5	2.0	2.0	11.33	14.75	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	4	43.31	43.31	1.5	1.5	2.0	2.0	11.33	14.75	0.00	0.15	0.00	0.00	0.00
TUCKPOINTER	All	BLD		50.53	51.53	1.5	1.5	2.0	2.0	9.55	21.72	0.00	1.11	0.00	0.00	0.00

### Legend

**Rg** Region

**Type** Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers

**C** Class

**Base** Base Wage Rate

**OT M-F** Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.

**OT Sa** Overtime pay required for every hour worked on Saturdays

**OT Su** Overtime pay required for every hour worked on Sundays

**OT Hol** Overtime pay required for every hour worked on Holidays

**H/W** Health/Welfare benefit

**Vac** Vacation

**Trng** Training

**Other Ins** Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

Explanations KANE COUNTY

ELECTRICIANS AND COMMUNICATIONS TECHNICIAN (NORTH) - Townships of Burlington, Campton, Dundee, Elgin, Hampshire, Plato, Rutland, St. Charles (except the West half of Sec. 26, all of Secs. 27, 33, and 34, South half of Sec. 28, West half of Sec. 35), Virgil and Valley View CCC and Elgin Mental Health Center.

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

## **Kane County Prevailing Wage Rates posted on 3/19/2024**

### EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date.

ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

### CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

### COMMUNICATIONS TECHNICIAN

Construction, installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security systems, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central offices, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN (wide area network), LAN (local area networks), and ISDN (integrated system digital network), pulling of wire in raceways, but not the installation of raceways.

### MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation

## **Kane County Prevailing Wage Rates posted on 3/19/2024**

of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

### **OPERATING ENGINEER - BUILDING**

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under; Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

## **Kane County Prevailing Wage Rates posted on 3/19/2024**

Class 6. Gradall.

Class 7. Mechanics; Welders.

### **OPERATING ENGINEERS - HIGHWAY CONSTRUCTION**

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines; ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane: Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical;

## **Kane County Prevailing Wage Rates posted on 3/19/2024**

Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

### **OPERATING ENGINEERS - FLOATING**

Diver. Diver Wet Tender, Diver Tender, ROV Pilot, ROV Tender

### **TRAFFIC SAFETY Worker I**

Traffic Safety Worker I - work associated with the delivery, installation, pick-up and servicing of safety devices during periods of roadway construction, including such work as set-up and maintenance of barricades, barrier wall reflectors, drums, cones, delineators, signs, crash attenuators, glare screen and other such items, and the layout and application or removal of conflicting and/or temporary roadway markings utilized to control traffic in construction zones, as well as flagging for these operations.

### **TRAFFIC SAFETY WORKER II**

Work associated with the installation and removal of permanent pavement markings and/or pavement markers including both installations performed by hand and installations performed by truck.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

## **Kane County Prevailing Wage Rates posted on 3/19/2024**

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

### **TERRAZZO FINISHER**

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

### **Other Classifications of Work:**

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

### **LANDSCAPING**

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

### **MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II**

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

**Kane County Prevailing Wage Rates posted on 3/19/2024**



AN ORDINANCE  
AMENDING TITLE 5 OF THE  
ELGIN MUNICIPAL CODE, 1976, AS AMENDED,  
ENTITLED "PROCUREMENTS"

WHEREAS, the City of Elgin is a home rule unit pursuant to Subsection (a) of Section 6 of Article VII of the Illinois Constitution of 1970; and

WHEREAS, pursuant to such section of the Illinois Constitution a home rule unit may exercise any power and perform any function pertaining to its governmental affairs; and

WHEREAS, the City of Elgin pursuant to its home rule powers has previously adopted a procurement ordinance pursuant to Title 5 of the Elgin Municipal Code, 1976, as amended, entitled "Procurements"; and

WHEREAS, the purpose of such procurement ordinance includes providing for the fair and equitable treatment of all persons involved in public purchasing by the city, to maximize the purchasing value of public funds and procurement, to obtain the best value for using departments, and to provide safeguards for maintaining a procurement system of quality and integrity; and

WHEREAS, the city council of the City of Elgin has determined that it is appropriate to amend the definitions within the City of Elgin's procurement ordinance to provide for a more comprehensive definition of a responsible bidder for certain contracts involving the city; and

WHEREAS, defining what constitutes a responsible bidder for certain city contracts and otherwise providing for procurements regulations for City of Elgin procurements pertains to the government and affairs of the city.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ELGIN, ILLINOIS:

Section 1. That Section 5.04.075 of the Elgin Municipal Code, 1976, as amended, entitled "Responsible Bidder or Offerer" be and is hereby further amended to read as follows:

"Responsible bidder or offerer" means a person who has the capability in all respects to perform fully the contract requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance. In addition to meeting such criteria a responsible bidder must also submit evidence of compliance with the following specific applicable criteria:

1. Documents evidencing compliance with all applicable laws and ordinances prerequisite to doing business in Illinois.

2. A valid federal employer tax identification number or, if an individual, a valid social security number.
3. A statement of compliance with the Equal Opportunity Employer provisions of Section 2000e of Chapter 21, Title 42 of the United States Code and federal executive order number 11246, as amended, by executive order 11375 and evidence of compliance with the Equal Opportunity Employer provisions of Elgin Municipal Code Section 3.12.100, as amended.
4. Certificates of insurance indicating insurance coverages as set forth in a bid specification including general liability, workers' compensation, completed operations, automobile, hazardous occupations and products liability.
5. Evidence of a written sexual harassment policy in compliance with the provisions of the Illinois Human Rights Act (775 ILCS 5/2-105(A)(4), as amended).
6. A statement of compliance with the provisions of the Illinois Prevailing Wage Act (820 ILCS 130/1 *et seq.*, as amended).
7. Evidence of compliance with the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 265/1 *et seq.*, as amended).
8. Evidence of relevant experience that indicates the necessary capacity to perform the project and adequate references verifying the quality of work performed.”
9. For city construction projects (construction of new city facilities, renovation of existing city facilities or city road construction projects) over Fifty Thousand Dollars (\$50,000) evidence of participation in an apprentice and training programs applicable to the work to be performed on the project which are approved by and registered with the United States Department of Labor Office of Apprenticeship and Training or are reasonable equivalent to such programs.
10. For city construction projects (construction of new city facilities, renovation of existing facilities or city road construction projects) bidders must demonstrate a good-faith effort toward providing equal employment opportunities for persons to work as craftspersons, laborers, workers or mechanics consistent with the racial, ethnic and gender demographics of the labor force available in the Illinois Department of Employment Security Chicago-Naperville-Joliet Metropolitan Division which consists of Cook, DeKalb, DuPage, Grundy, Kane, Kendall, McHenry and Will counties.”

Section 2. If any provision, clause, sentence, paragraph, section or part of this ordinance, or application thereof, to any person or circumstance, shall for any reason be adjudged by a court of competent jurisdiction to be unconstitutional or invalid, said judgment shall not affect, impair, or validate the remainder of this ordinance and the application of such provisions to other persons or circumstances shall be confined in its operation to the provision, clause, sentence, paragraph, section or part thereof directly involved with the controversy in which such judgment shall have been rendered and to the person or circumstance involved. It is hereby declared to be the legislative intent of the city council that this chapter would have been adopted had such constitutional or invalid provisions, clause, sentence, paragraph, section or part thereof not been included.

Section 3. That all ordinances or parts or ordinances in conflict with the provisions of this ordinance be and are hereby repealed.

Section 4. That this ordinance shall be in full force and effect upon its passage and publication in the manner provided by law. The amendatory provisions of this ordinance shall be applicable to bids issued after the effective date of this ordinance.

---

Ed Schock, Mayor

Presented: March 23, 2011

Passed:

Vote: Yeas      Nays:

Recorded:

Published:

Attest:

---

Diane Robertson, City Clerk

**ELGIN  
RESIDENCY  
ORDINANCE**

DOCUMENT 003119 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Survey information that includes information on existing conditions is included in the Drawings
- C. Site pothole information included in Appendix.
- D. Related Requirements:
  - 1. Document "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
  - 2. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

END OF DOCUMENT 003119

DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical investigation report for Project, prepared by GSG Consultants, inc., dated 12/19/2023, is available for viewing as appended to this Document.
  - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
  - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Related Requirements:
  - 1. Document "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
  - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.

END OF DOCUMENT 003132

DOCUMENT 003119 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Survey information that includes information on existing conditions is included in the Drawings
- C. Site pothole information included in Appendix.
- D. Related Requirements:
  - 1. Document "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
  - 2. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

END OF DOCUMENT 003119

DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical investigation report for Project, prepared by GSG Consultants, inc., dated 12/19/2023, is available for viewing as appended to this Document.
  - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
  - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Related Requirements:
  - 1. Document "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
  - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.

END OF DOCUMENT 003132



SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Contractor's use of site and premises.
  - 4. Coordination with occupants.
  - 5. Work restrictions.
  - 6. Specification and Drawing conventions.
- B. Related Requirements:
  - 1. Section 013573 "Delegated Design Requirements and Procedures" for definitions, submittal procedures, responsibilities, and scheduling requirements associated with delegated design.
  - 2. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
  - 3. Section 017300 "Execution" for general administrative and procedural requirements.

1.2 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.3 PROJECT INFORMATION

- A. Project Identification: Elgin Sports Complex Expansion.
- B. Owner: City of Elgin - 150 Dexter Court, Elgin, IL 60120.
- C. Engineer: SmithGroup - 35 East Wacker, Suite 900, Chicago, IL.
  - 1. Representative: Paul Wiese, 35 East Wacker, Suite 900, Chicago, IL, 312.641.6756.
- D. Engineer's Consultants: The following design professionals have prepared designated portions of the Contract Documents
  - 1. Architect: Studio AH, LLC (DBA: HPZS).
    - a. Representative: April Marie Hughes, 314 W Institute Place, Suite 1E, Chicago, Illinois 60610

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
  - 1. The Sports Complex Expansion project includes base scope and a series of alternates. The base scope includes turf athletic fields, a concession building, a maintenance building, an open air pavilion shelter, parking, plaza space, stormwater basins and other Work indicated in the Contract Documents.
- B. Type of Contract:
  - 1. Project will be constructed under a single prime contract.

#### 1.5 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Limits on Use of Site: Confine construction operations to areas identified in drawings.
  - 2. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

#### 1.6 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner may occupy the premises during construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

#### 1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7 a.m. to 7 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
  - 1. Weekend Hours: Saturday hours can be allowed. Sunday work requires Owner provided written approval.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services in accordance with requirements indicated:
  - 1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.

- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
  - 1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
  - 3. See Elgin Noise Ordinance for more information on noise requirements.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Project site is not permitted.
- F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

#### 1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
  - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

### 1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

### 1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: - Synthetic Turf Alternative Infill and Shock Pad:
  - 1. Base Bid: The base bid includes rubberized infill material and no shock pad as indicated on Drawings and as specified.
  - 2. Alternate: The alternate incorporates a shock pad and changes the infill material from rubber to a resilient infill material as indicated on Drawings and as specified.
- B. Alternate No. 2 - Athletic Field #3:
  - 1. Base Bid: The base bid has irrigated lawn as indicated on Drawings and as specified.
  - 2. Alternate: The alternate replaces the irrigated lawn with synthetic turf including resilient infill and a shock pad. It also includes additional field lighting, drainage infrastructure and fencing as indicated on Drawings and as specified.
- C. Alternate No. 3 - Playground:
  - 1. Base Bid: The base includes lawn as indicated on Drawings and as specified.
  - 2. Alternate: The alternate replaces lawn with playground structures, synthetic turf, benches, fencing, plantings and utilities as indicated on Drawings and as specified.

- D. Alternate No. 4 - Parking Lot 2 - North Lot:
  - 1. Base Bid: The base includes lawn as indicated on Drawings and as specified.
  - 2. Alternate: The alternate replaces lawn with paved parking, stormwater infrastructure, plantings, lighting and other utilities as indicated on Drawings and as specified.
  
- E. Alternate No. 5 - Parking Lot 3 - East Lot:
  - 1. Base Bid: The base includes lawn as indicated on Drawings and as specified.
  - 2. Alternate: The alternate replaces lawn with paved parking, stormwater infrastructure, plantings, lighting and other utilities as indicated on Drawings and as specified.
  
- F. Alternate No. 6 - Permeable Vehicular Pavers:
  - 1. Base Bid: The base bid has asphalt as indicated on Drawings and as specified.
  - 2. Alternative: The alternate replaces the asphalt to permeable pavers and adds drainage infrastructure as indicated on Drawings and as specified.
  
- G. Alternate No. 7 - Permeable Plaza Pavers:
  - 1. Base Bid: The base bid has concrete paving as indicated on Drawings and as specified.
  - 2. Alternate: The alternate replaces the concrete to permeable pavers, adds containment curb and adds drainage infrastructure as indicated on Drawings and as specified.
  
- H. Alternate No. 8 - Native Landscape Year 3
  - 1. Alternate: Add native landscape year 3.

END OF SECTION

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for products selected under an allowance.
  - 2. Section 012300 "Alternates" for products selected under an alternate.
  - 3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Proposed Products List and Substitution Requests:
  - 1. Intent:
    - a. To fully identify, prior to beginning the Work, the products Contractor intends to provide, and substitutions the Contractor requests.
    - b. To facilitate timely submittal processing by avoiding rejection of unacceptable products and unspecified products later during construction.
  - 2. Proposed Products List:
    - a. Within 14 calendar days after date of receipt of notice to proceed and before submitting any Product Submittals, submit for approval the list of the products proposed for installation. Include the name of the manufacturer for each product and, where applicable, the name of Subcontractor.
    - b. The list shall be tabulated by and be complete for each Specification Section.
    - c. For each product listed, clearly indicate: a) As Specified, or b) Not As Specified. For each product designated Not As Specified, clearly indicate: c) Comparable Product, or d) Proposed Substitution.
- B. Substitution Requests Accompanying the Proposed Products List:
  - 1. A request for substitution will be considered, subject to the following requirements:
    - a. Include with the proposed products list a completed substitution request form for each proposed substitution anticipated for the Project. Check the box indicating the request is submitted with the proposed products list.
    - b. Submit each proposed substitution using a separate copy of the substitution request form. Use substitution request form included in the Project Manual, or request an electronic version of form from the Architect. See Section 012510 Substitution Request Form. • • Submit in number of copies specified for proposed product list.
    - c. The substitution request is submitted at the time the proposed products list is submitted. A request submitted after the time set for submittal of the proposed products list is subject to automatic rejection.

- d. Include with the request complete data on the proposed substitution. Such data shall include:
  - 1) Product Data highlighted to show applicability to the proposed substitution and project conditions;
  - 2) Performance and test data;
  - 3) References, and samples, where applicable; and
  - 4) An itemized comparison of the proposed substitution with the product features specified in the Contract Documents, including data relating to design and artistic effect, where applicable.
- e. Include copies of the pertinent Contract Documents, clearly marked and highlighted to show changes necessary to accommodate the proposed substitution.
- f. If the proposed substitution is due to unavailability of a specified product, a written statement shall accompany it, written by the supplier of the specified product, confirming lack of availability.
- g. By submitting the substitution request, Contractor affirms that: 1) the proposed substitution conforms to the required dimensions and meets or exceeds the standards of required function, appearance, and quality set by the specified product: and 2) the burden of proof rests with the Contractor.
- h. By submitting a substitution request, Contractor agrees to absorb all costs resulting from acceptance of the proposed substitution, including both known and subsequently discovered revisions to other construction needed to accommodate the substitution, and other expected and unforeseen costs, such as delays, code approval-related expenses, and additional architectural services.

C. Substitution Requests After Proposed Products List:

1. Use no product in the Work that is not named in the Contract Documents, or not listed in the Proposed Products List, or not approved as a substitute or comparable product. Products specified solely by reference standard or performance requirements do not require naming.
2. During construction of the Work, products not listed on the accepted Proposed Products List shall not be used without receipt of an approved substitution request for a listed product. A substitution request will be considered under one of the following conditions:
  - a. The product listed on the accepted Proposed Product List becomes unavailable. Include with the substitution request a letter from the listed manufacturer, on the manufacturer's letterhead, verifying that the product is no longer available.
  - b. Conditions uncovered at the Site render the listed product inappropriate, or an undesirable choice for the conditions uncovered. Include with the substitution request a full description of the uncovered conditions and why the requested substitution is preferable to the listed product.
3. Make each substitution request on the specified substitution request form. Fully execute form in accordance with the provisions of Article, Proposed Products List and Accompanying Substitution Requests, except for provisions requiring submittal concurrent with proposed products list. Check the box indicating the Contractor's request is being submitted separate from and after submittal of the proposed products list

D. A request for substitution forwarded by the Contractor means that Contractor:

1. Has investigated the proposed substitution.
2. Has determined that the substitution is equal to or superior in quality and serviceability (performance) to the product specified in the Contract Documents.
3. Will provide the same guarantee for the substitution that is required for the product specified in the Contract Documents.
4. Waives all claims for additional costs that subsequently become apparent as a result of the substitution.
5. Will coordinate the installation of the accepted substitution into the Work, and will make such changes in the Work of the various trades as may be required to provide a completed condition.

- E. A request for a substitution will not be considered if:
  - 1. The substitution is merely indicated or implied on the Shop Drawing or Product Data submittal without the specified formal request and documented proof of conformance. Submittal approvals for items not meeting specifications are not valid. Completed construction related to such items is subject to rejection.
  - 2. Implementation requires a major revision of the Contract Documents in order to accommodate the substitution.
  - 3. The substitution request is substantially incomplete.
  
- F. Architect's Review of Proposed Products List and Substitution Requests:
  - 1. The Architect will review properly submitted proposed products list and accompanying substitution requests.
  - 2. The Architect will evaluate each substitution request and inform Contractor in writing whether the proposed substitution is accepted, accepted as noted, or not accepted.
    - a. Substitution requests that do not conform to requirements, including submittal timing, are subject to return without review.
    - b. A substitution will not be considered accepted by the Owner until it has been documented by Change Order.
  - 3. The Architect's decision as to conformance and acceptability will be consistent with the intent of the Contract Documents.
  - 4. In the absence of written acceptance of a substitution request, proposed substitutions shall be understood as not accepted.
  - 5. The Architect will endeavor to evaluate the substitution request in a reasonable period of time. With the request, the Contractor shall inform the Architect of the deadline for final decision on the request. In the absence of Architect's decision within the critical time, the Contractor shall proceed with the specified product.
  
- G. Product List and Substitution Request Format:
  - 1. Product List: Provide PDF of the list.
  - 2. Substitution Requests: Provide PDF of requests.

#### 1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

#### 1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

#### 1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution will not adversely affect Contractor's construction schedule.
    - c. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - d. Requested substitution is compatible with other portions of the Work.
    - e. Requested substitution has been coordinated with other portions of the Work.



- f. Requested substitution provides specified warranty.
  - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within [60] <Insert number> days after [commencement of the Work] [the Notice to Proceed] [the Notice of Award]. Requests received after that time may be considered or rejected at discretion of Architect.
- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Requested substitution will not adversely affect Contractor's construction schedule.
    - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - f. Requested substitution is compatible with other portions of the Work.
    - g. Requested substitution has been coordinated with other portions of the Work.
    - h. Requested substitution provides specified warranty.
    - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION



SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
  - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on EJCDC Document C-940. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at pre-construction meeting, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Owner's name.
    - c. Owner's Project number.
    - d. Name of Architect.
    - e. Architect's Project number.
    - f. Contractor's name and address.
    - g. Date of submittal.
  - 2. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
      - 1) Labor.
      - 2) Materials.
      - 3) Equipment.
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
  - 4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site.

5. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
6. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
7. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

### 1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

- G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Submittal schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
  13. Certificates of insurance and insurance policies.
  14. Performance and payment bonds.
  15. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
    - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Certification of completion of final punch list items.

3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION



SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 013573 "Delegated Design Requirements and Procedures" for definitions, submittal procedures, responsibilities, and scheduling requirements associated with delegated design.
  - 3. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 4. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in Project meeting room, in temporary field office and in prominent location in each built facility. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components with other contractors, including delegated design coordination recommendations, if needed, to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delegated design services.
  5. Delivery and processing of submittals.
  6. Progress meetings.
  7. Preinstallation conferences.
  8. Project closeout activities.
  9. Startup and adjustment of systems.

#### 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information, including delegated design information, to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - f. Indicate required installation sequences.
    - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

1.6 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. RFIs shall be submitted through the Contractor. RFI's submitted otherwise will be returned
  2. unprocessed, without response.
  3. In order to expedite processing, each RFI shall include only one distinct issue.
  4. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Project schedule.
  5. RFI's that do not contain adequate references to the Drawings and Specifications are subject to
  6. immediate rejection.
  7. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  8. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
  9. Unnecessary RFI's: If an RFI can be answered clearly by referencing the Contract Documents, the RFI will be considered unnecessary. The Owner reserves the right to be reimbursed by the Contractor, for the Architect's fees for processing unnecessary RFI's.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Owner name.
  3. Owner's Project number.
  4. Name of Architect.
  5. Architect's Project number.
  6. Date.
  7. Name of Contractor.
  8. RFI number, numbered sequentially.
  9. RFI subject.
  10. Specification Section number and title and related paragraphs, as appropriate.
  11. Drawing number and detail references, as appropriate.
  12. Field dimensions and conditions, as appropriate.
  13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  14. Contractor's signature.
  15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven business days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following business day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.



- k. Distribution of the Contract Documents.
  - l. Submittal procedures.
  - m. Delegated design requirements.
  - n. Preparation of Record Documents.
  - o. Use of the premises.
  - p. Work restrictions.
  - q. Working hours.
  - r. Owner's occupancy requirements.
  - s. Responsibility for temporary facilities and controls.
  - t. Procedures for moisture and mold control.
  - u. Procedures for disruptions and shutdowns.
  - v. Construction waste management and recycling.
  - w. Parking availability.
  - x. Office, work, and storage areas.
  - y. Equipment deliveries and priorities.
  - z. First aid.
  - aa. Security.
  - bb. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Delegated design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Procedures for completing and archiving web-based Project software site data files.
    - d. Submittal of written warranties.
    - e. Requirements for preparing operations and maintenance data.
    - f. Requirements for delivery of material samples, attic stock, and spare parts.
    - g. Requirements for demonstration and training.
    - h. Preparation of Contractor's punch list.
    - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - j. Submittal procedures.
    - k. Owner's partial occupancy requirements.
    - l. Installation of Owner's furniture, fixtures, and equipment.
    - m. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of delegated design services and submittals.
      - 4) Deliveries.

- 5) Off-site fabrication.
  - 6) Access.
  - 7) Site use.
  - 8) Temporary facilities and controls.
  - 9) Progress cleaning.
  - 10) Quality and work standards.
  - 11) Status of correction of deficient items.
  - 12) Field observations.
  - 13) Status of RFIs.
  - 14) Status of Proposal Requests.
  - 15) Pending changes.
  - 16) Status of Change Orders.
  - 17) Pending claims and disputes.
  - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013110 - REQUEST FOR INFORMATION

(This form is to be transmitted from GC or CM to SmithGroup) RFI NO.: \_\_\_\_\_  
 DATE TRANSMITTED: \_\_\_\_\_; Bid Pack: \_\_\_\_\_; Trade Contract: \_\_\_\_\_  
 Response requested from:  Civil;  Struct;  Arch;  Mech;  Elec;  Other \_\_\_\_\_  
 Brief description of RFI: (give details below): \_\_\_\_\_

PROVIDE SPECIFIC REFERENCES:	Section No.	Section No.	Section No.	Section No.	Section No.	example:
→	Reference No.	Reference No.	Reference No.	Reference No.	Reference No.	Section No. 019999 Reference No. 2.2.A.1
	_____	_____	_____	_____	_____	

PROVIDE DRAWING REFERENCES: \_\_\_\_\_

**Contractor requests information for the following from SmithGroup:**

(Note: Request information for only 1 item per RFI. This permits individual handling and expedites response.)

- This box, if checked, indicates a potential change to the Contract Sum associated with this RFI.  
 The change is in the range of \$ \_\_\_\_\_ to \$ \_\_\_\_\_.
- This box, if checked, indicates a potential change to the Contract Time associated with this RFI.  
 The change is in the range of \_\_\_\_\_ days to \_\_\_\_\_ days

Requested By: (name): \_\_\_\_\_  
 (After saving file, email or fax to SmithGroup Project Architect or Project Administrator.)

**SmithGroup response:** Date Received: \_\_\_\_\_

- SG DOES NOT expect a change to the  Contract Sum  Contract Time related to this RFI.  
 SG expect a change to the  Contract Sum  Contract Time related to this RFI.

Response By: \_\_\_\_\_ Date: \_\_\_\_\_

Date Transmitted: \_\_\_\_\_ (Indicate the recipients and the means of transmittal below)

Distributed to: Name, Email Address or Fax Number	Email	Fax	Hand	Mail
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SmithGroup: Master Office Files

NOTE: This form is formatted for completion on screen using MS Word. Only form revisions by SmithGroup are valid.

END OF DOCUMENT



SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's Construction Schedule.
  - 3. Construction schedule updating reports.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Unusual event reports.
- B. Related Requirements:
  - 1. Section 012900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.
  - 2. Section 014000 "Quality Requirements" for schedule of tests and inspections.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of labor and equipment necessary for completing an activity as scheduled.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file.
  - 2. PDF file.
- B. Startup construction schedule.
  - 1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports to contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
  - 3. Total Float Report: List of activities sorted in ascending order of total float.
  - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at weekly intervals.
- H. Material Location Reports: Submit at monthly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

### 1.4 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.

3. Discuss constraints, including work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

#### 1.5 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

#### 1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.
  1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  2. Meetings: Scheduling consultant to attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
  1. Contract completion date to not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
    - a. Securing of approvals and permits required for performance of the Work.
    - b. Temporary facilities.
    - c. Construction of mock-ups, prototypes and samples.
    - d. Owner interfaces and furnishing of items.
    - e. Interfaces with Separate Contracts.
    - f. Regulatory agency approvals.
    - g. Punch list.
  3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
  5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  6. Commissioning Time: Include no fewer than 15 days for commissioning.
  7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  2. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  3. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use-of-premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
    - n. Commissioning.
  5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.

- F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
  - 1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.
- G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  - 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and the Contract Time.
- H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate Final Completion percentage for each activity.
- I. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

#### 1.7 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

#### 1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.
  - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

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

#### 1.9 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Testing and inspection.
  8. Accidents.
  9. Meetings and significant decisions.
  10. Unusual events.
  11. Stoppages, delays, shortages, and losses.
  12. Meter readings and similar recordings.
  13. Emergency procedures.
  14. Orders and requests of authorities having jurisdiction.
  15. Change Orders received and implemented.
  16. Work Change Directives received and implemented.
  17. Services connected and disconnected.
  18. Equipment or system tests and startups.
  19. Partial completions and occupancies.
  20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List to be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
  1. Material stored prior to previous report and remaining in storage.
  2. Material stored prior to previous report and since removed from storage and installed.
  3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
  1. Submit unusual event reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

City of Elgin  
Elgin Sports Complex Expansion -  
Phase 1

14106.002  
Issue For Bid  
Not For Construction

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Concealed Work photographs.
  - 3. Periodic construction photographs.
  - 4. Time-lapse sequence construction photographs.
  - 5. Final Completion construction photographs.
- B. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
  - 2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
  - 3. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Include copy of key plan indicating each photograph's location and direction.
  - 2. Identification: Provide the following information with each image description in web-based Project management software site:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Date photograph was taken.
    - f. Description of location, vantage point, and direction.
    - g. Unique sequential identifier keyed to accompanying key plan.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Metadata: Record accurate date and time and GPS location data from camera.
- C. File Names: Name media files with date, Project area and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.



- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
  - 1. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 2. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
  - 3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
  
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
  - 1. Underground utilities.
  - 2. Underslab services.
  - 3. Piping.
  - 4. Electrical conduit.
  - 5. Waterproofing and weather-resistant barriers.
  
- D. Periodic Construction Photographs: Take 20 or more photographs weekly . Select vantage points to show status of construction and progress since last photographs were taken.
  
- E. Final Completion Construction Photographs: Take 50 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
  - 1. Submittal schedule requirements.
  - 2. Administrative and procedural requirements for submittals.
  
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for submitting Proposed Products List.
  - 2. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 3. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontractor list and for requirements for web-based Project software.
  - 4. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 5. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
  - 6. Section 013573 "Delegated Design Requirements and Procedures" for definitions, submittal procedures, responsibilities, and scheduling requirements associated with delegated design.
  - 7. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
  - 8. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
  - 9. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 10. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 11. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager. Contractor shall review and approve product submittals.
  - 1. Contractor shall review and approve Product Submittals prior to forwarding them to the Architect.
  
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
  - 1. Shop Drawings: Drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
  - 2. Product Data: Illustrations, standard schedules, performance charts, color charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
    - a. Product Data does not include Material Safety Data Sheets. Do not submit MSDS. They will be returned without review.
  - 3. Samples: Physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged

- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Closeout Submittals: Written and graphic information that do not require Architect's responsive action. Closeout submittals are those submittals indicated in individual Specification Sections as "closeout submittals."
- F. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- G. Submittal Review Stamp: The review stamp used by the Contractor as evidence that submittal has been reviewed for compliance with Contract Documents.
- H. Submittal Review Sheet: The document provided by the Architect to the Contractor for inclusion with all submittals.

### 1.3 ACTION SUBMITTALS

- A. Submittal Compliance Form: Allowed in lieu of some product data and sample submittals. See individual specification sections for specific allowable use. By submitting the form, the Contractor certifies that all products specified in the Section are being submitted exactly as indicated, including all options and features indicated, with no substitutions or comparable products. Where a Basis-of-Design manufacturer/product is indicated, along with a list of other manufacturers, the Contractor certifies that only the Basis-of-Design manufacturer/product will be provided and not any other listed manufacturers/products. Where a single manufacturer/product is indicated, even if specified as "available manufacturer" or manufacturer "included but not limited to the following", Contractor certifies that only the indicated single manufacturer/product will be provided.
  - 1. Fill in the information required for Document 013330 "Submittal Compliance Form" and include as a line item on the Submittal Cover Sheet for each applicable Submittal. An editable version of this form is available from the Architect.
  - 2. Upon receipt, the Architect will complete the form in the space below "Architect Action" and indicate the Action on the Submittal Cover Sheet.
  - 3. Procedures and processing time are the same as indicated in this Section.
- B. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections. Note that submittal schedule is a separate document required in addition to the construction schedule.
  - 1. Submit all required types of submittals for each product together. For example: Shop Drawings will not be reviewed when related Samples, Product Data, and test reports have not been submitted.
  - 2. Coordinate submittal schedule with list of subcontractors, the schedule of values, and Contractor's construction schedule.

3. Initial Submittal Schedule: Submit initial Submittals Schedule not more than 7 days after receipt of reviewed Proposed Products List, or concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - a. See Section 012500 "Substitution Procedures" for Proposed Products List requirements.
4. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
  - b. Categorize submittal items by type, and designate the respective types by type code. Refer to code definitions below.

Type	Code Explanation
SD	Shop Drawings
PD	Product Data
S	Sample
DC	Design Calculations
L	Letter
SoC	Statement of Compliance
Cer	Certificate/Certification
Q	Qualifications Statement (such as for Contractor, fabricator, or erector)
SC	Sample Construction (such as mock-up or sample installation)
InI	Installation Instructions
AT	Acceptance Test
OpI	Operating Instructions
MaI	Maintenance Instructions
MAA	Maintenance Agreement
MaM	Maintenance Materials
Rcp	Receipt (such as for keys, tools, and detachable parts, including delivery tickets)
RD	Record Documents
SW	Special Warranty
TR	Test Report

5. Third Party Software:
  - a. If third party software (i.e. Procore, e-Builder, etc.) is being utilized to distribute and track submittal responses, revise the third party software review codes to match the Architect's review codes.
  - b. If third party software review codes cannot be modified, then the Architect's review codes, as indicated on the Architect's Submittal Review Sheet, shall take precedence.
  - c. If a submittal is returned using third party software and the selected review code assigned to the submittal in the software response differs from the Architect's review codes, in all cases the codes indicated on the Architect's Submittal Review Sheet shall take precedence.
6. "Latest possible date" means the date of receipt by Architect. This date allows for review and return to Contractor in time to meet the construction schedule.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Architect will accept submittals only from the Contractor. Only items specified to be submitted will be accepted.

- C. Bind submittals in a manner suitable for 8-1/2 by 11-inch file folder storage, except where doing so is not workable.
- D. Transmit submittals with all transportation charges prepaid.
- E. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- F. MSDS: Do not submit Material Safety Data Sheets. If MSDS are required by the Contract Documents, request clarification of instructions from the Architect.
- G. Architect's Digital Data Files:
  - 1. With the Owner's concurrence, Architect's and CAD drawing digital data files used to create the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals, subject to the Architect's electronic file transfer agreement. The Contractor shall expect, and shall so agree, to execute and deliver the Architect's agreement before the transfer of such Instruments of Service.
  - 2. Request the Architect's electronic file transfer agreement form. Submit the request for file transfer directly to the Architect.
  - 3. The files will not be identical to the Contract Drawings. Prior to requesting files, discuss with the Architect how the files will differ from the Contract Documents, and related limitations, such as which Drawings will not be represented, the file format, what information will be included, and method of transmittal.
- H. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- I. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
  - 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
  - 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
  - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.

- J. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

#### 1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Before preparing the initial submittal of each type, request the Architect's direction regarding the Contractor's Transmittal format. All submittals, except for samples, shall be submitted as PDF electronic files unless indicated otherwise.
  - 1. Submit electronic submittals as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Action Submittals: Submit electronic PDF files of each submittal unless otherwise indicated. Architect will return electronic PDF copies.
  - 3. Informational Submittals: Submit electronic PDF files of each submittal unless otherwise indicated. Architect will return a received receipt without further review.
  - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.

#### 1.6 PREPARING SUBMITTALS

- A. Title Block for Product Submittals
  - 1. Shop Drawings, the cover sheets for Product Data, and the labels for Samples shall each have an identifying title block containing:
    - a. Project title.
    - b. Architect's name, Project Number, and Contract Package title.
    - c. Brief description of each submittal item matching the itemized descriptions on the Contractor's Submittal Transmittal.
    - d. Contractor's name and project or contract number.
    - e. Name and phone number of manufacturer, supplier, subcontractor, or other such organization furnishing the submittal to the Contractor.
- B. Product Data: Collect information into a single submittal per specification section for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
    - a. Mark where selections are to be made.
    - b. Tailor large catalogs so that excessive unrelated products are not included.
  - 3. To highlight and mark-up Product Data information, use bold markings that will be easily seen on electronic file format. Do not use a highlighter, pencil, or color.
  - 4. Clearly convey the differences between similar products included in the submittal.
    - a. Highlight information that differs for different sizes or grades.
  - 5. Correlate Product Data with Contract Documents:
    - a. Where the Contract Documents include designations such as types or marks, mark Product Data with these itemized designations and include them on the Submittal Transmittal. For example: glass types; fixture item numbers.
    - b. Clearly highlight information on Product Data that shows compliance with specified requirements. For example: manufacturer only (not supplier, distributor, etc.); model number; rating; performance characteristics.

6. If multiple manufacturers or products are being submitted for similar items, include manufacturer or product name in separate line item descriptions on the Contractor's Submittal Transmittal. Do not use distributor or other supplier names other than manufacturer.
  7. Dimensioning on Product Data shall be the same system of measure (inch-pound vs. metric) as on the Contract Drawings. If preprinted catalogs display only the system not used in the Contract Drawings, mark-up the Product Data with the other system's dimensions.
  8. Submit Product Data before or concurrent with Samples.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings PDFs formatted such that when printed will fit on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
  3. Each sheet of the same item or system shall be uniform in size and numbered consecutively.
  4. Each sheet shall contain the title block specified below plus an unobstructed space at the right side or bottom, of size not less than 6 by 8 inches for submittal review stamps and notations.
  5. Dimensions on Shop Drawings shall be the same system of measure (i.e., inch-pound or metric) as on the Contract Drawings.
  6. BIM Incorporation: Shop Drawings into BIM established for Project.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Submit submittal transmittal electronically as directed above. Electronic copy shall contain digital images of samples with identifying labels clearly visible.
  2. Submit samples with identifying labels firmly attached.
    - a. Labels shall be of a size to contain the Title Block plus unobstructed space for Submittal Review Stamp(s) and notations.
    - b. Each sample shall display, as a minimum, the Architect's project number, and the submittal and item numbers. Where Sample size does not permit the full title block without obstructing information, provide a separate sheet of paper, 8-1/2 by 11-inch, securely attached to each sample (or sample set), with the information above included.
  3. Recording of Sample Installation: Note and preserve the on-site indicators of each area constituting a sample installation, but remove indicators at final clean-up of Project. Use normal submittal form and process to provide record of sample.
  4. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of the specified product for comparison if another product is submitted.
  5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

- a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Unless indicated otherwise in individual specification sections, provide three sets of Samples. One to the Architect who will retain it for their records; one to the Owner and one shall be retained at the jobsite.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- G. Certificates:
  1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
  2. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
  3. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  4. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
  6. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- H. Test and Research Reports:



1. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
  2. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
  3. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    - a. Name of evaluation organization.
    - b. Date of evaluation.
    - c. Time period when report is in effect.
    - d. Product and manufacturers' names.
    - e. Description of product.
    - f. Test procedures and results.
    - g. Limitations of use.
  4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
  5. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
  6. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- I. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- J. Subcontractor List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
- 1.7 CONTRACTOR'S REVIEW
- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark up with review comments before submitting to Architect .
- B. The Contractor shall be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of all trades.
- C. The Contractor shall be responsible for the submittal to be in conformance with information given and the design concept expressed in the Contract Documents.

- D. The Contractor with each submission shall provide specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal attachments or the Submittal-Transmittal.
  - E. The Contractor shall affix its own Submittal Review Stamp to all submittals. Architect will not review submittals that do not include a completed Contractor's Submittal Review stamp.
    - 1. AFFIXING REVIEW STAMP Separate Line Items: Affix an image of the Review Stamp to each separately-reviewable item of the submittal package. For example: On each separate Shop Drawing sheet, affix a Review Stamp image.
    - 2. For each separate item appearing on a Contract Document schedule, affix a separate Review
    - 3. Stamp image. For example: lighting fixture; plumbing fixture.
    - 4. For each separate type of a product identified for the specified item, affix a separate Review
    - 5. Stamp image. For example, glass type; masonry unit type; metal panel type.
  - F. When affixed, the Review Stamp shall not obscure information contained in the submittal.
  - G. Fill in name of Contractor and Contractor's project or contract number, if not already entered on stamp.
  - H. In the section of the stamp titled "Contractor Action," fill in the following information:
    - 1. Section number of the Specification Section for which the submittal is being made, and Paragraph number of specific submittal requirement within the Section. Do not include items from more than one Specification Section on one form.
    - 2. Submittal number: Refer to Submittal Form Instructions for submittal numbering.
    - 3. Item number as shown on the Submittal Form.
    - 4. Date submitted by Contractor.
    - 5. Mark to signify whether item is Shop Drawing, Product Data, or Sample, or, if 'Other,' enter descriptive words on the blank line.
    - 6. Signature of authorized representative of the Contractor who has performed the Contractor's review and approval of the submittal item, and the date.
- 1.8 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION
- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
  - B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.
  - C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
  - D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
  - E. Review Code meanings are as follows:
    - 1. Action Codes Permitting Use:
      - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
      - b. Code AP - Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
      - c. Code AN - Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.

- d. Code AN-R - Approved as Noted - Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
  2. Action Code Prohibiting Use:
    - a. Action Code REJ - Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
  3. Action Code for Items Not Required:
    - a. Action Code X - Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
1. Action Code for Information Only:
    - a. Action Code INF - Information Only - Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned without review.
- I. Architect will submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.

## 1.9 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. General: The Contractor's Submittal Transmittal shall be a PDF electronic file. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
1. Submittal Numbering: See below.
  2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition:
1. Each submittal consists of items from only ONE specifications section.
  2. Complete Submittal: If ALL the items required by the specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
  3. Partial Submittals: If it is necessary to divide the required items of a given specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
  4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.
- C. Submittal Numbering:
1. Number submittals as described below to assist tracking.
  2. Number each submittal in the format nnnnnn-nn.

- a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
  - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
  - c. P-Number for Partial Submittals: Number each partial submittal in the P space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
  - d. R-Number for Re-submittals: Number each re-submittal in the R space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
  - e. Examples:
    - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
    - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.
- D. Item Kind: Identify each submittal item using the code explanation specified for submittal schedule entries.
- E. Shop Drawings: Include a description of each drawing, matching the description on the drawing itself.
- F. Description: Provide a brief, clear generic description of each line item, using the Drawings or Specifications as a guide. If more than one manufacturer's model numbers are included in the submittal package, indicate the model numbers in parentheses in the affected line items. Do not list distributors or suppliers other than the manufacturer.
- G. Resubmittals: In addition to providing the R-number, enter the information using the same line item number as the original submittal package. Doing so will avoid delay in handling the resubmittal package. Resubmit only those items that previously received Code No. AN-R or REJ.
- 1.10 SUBMITTAL REVIEW SHEET REQUIREMENTS
- A. General: The Contractor shall obtain the Submittal Review Sheet from the Architect's Project Manager.
  - B. The Submittal Review Sheet obtained shall be in PDF format, and shall be submitted as the page after the Submittal Transmittal.
  - C. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
  - D. The Contractor shall not edit any of the information contained within the Submittal Review Sheet except as follows:
    1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
  - E. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by Architect and its consultants.
  - F.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION [(Not Used)]

3.1 ATTACHMENTS

A. Sample Submittal Review Sheet.

END OF SECTION

DOCUMENT 013330 - SUBMITTAL COMPLIANCE FORM

*Instructions:*

1. Use the Submittal Compliance Form only with items that specify its use. Use a separate form each product. If this Form is used for items that do not specify its use, the submittal will be returned without review.
2. Do not submit Product Data and/or Samples for products covered by this form.
3. This form is available for completing on-screen with Microsoft Word.

Date Submitted: / /202<sub>1</sub>

Submittal Package No / Partial No / Revision No:  /  /  Item No.

Construction Manager/General Contractor:  Project No:

Trade or Subcontractor:

This Submittal Compliance Form is required by:

Spec Section No  Paragraph Reference(s):

Description of Item:

Manufacturer:

Model No. or Series:

Phone No:  Website Address:

**By signing below, Contractor certifies that:**

1. The item represented by this Submittal Compliance Form conforms to all Contract requirements and the intent expressed in the Contract Documents.
2. There is not a substitution of specified products. The exact named product and characteristics will be provided.
3. Contractor is responsible for: quantities, weights, and dimensions to be confirmed and correlated at the site; information that pertains solely to the fabrication processes; the means, methods, techniques, sequences, and procedures of construction; coordination of the work of all trades.

Reviewed and approved for Contractor by: Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Architect Action:**

Architect's review is only for the limited purpose of checking that the item is allowed to be submitted under this form.

<u>Legend - Submittal is:</u>	<u>Code</u>
APPROVED	AP
REJECTED	REJ
NOT REQUESTED BY CONTRACT DOCUMENTS	X

Discipline	Date	Reviewed By	Code
<input type="checkbox"/> Architect:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Structural:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Mechanical:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Electrical:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Other: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

END OF DOCUMENT

SECTION 013573 - DELEGATED DESIGN REQUIREMENTS AND PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes procedures for portions of Work under this Contract that include delegated design requirements and procedures.
- B. Related Requirements:
  - 1. Section 013100 "Project Management and Coordination" for project management and coordination with delegated design requirements.
  - 2. Section 014000 "Quality Requirements" for quality assurance requirements with delegated design requirements.

1.2 DEFINITIONS

- A. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- B. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- C. AHJ: Authority having jurisdiction.
- D. Technical Sections: Specification sections included in Divisions 02 through 35 of the Project Manual.

1.3 SUBMITTAL PROCEDURES

- A. Performance and Design Criteria: Where delegated design services are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If specific performance and design criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
  - 2. Architect's and Engineer's review of delegated design submittal shall be for conformance with performance and design criteria only.
- B. Delegated-Design Services Submittal: Include Shop Drawings, Product Data, and other required submittals indicated in individual technical sections. Submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. In addition to other submittal requirements specified in other technical sections, at minimum, include the following in delegated design submittal:
    - a. Statement of design and performance criteria identified by the Contract Documents.
    - b. Assumptions.
    - c. Details, calculations, etc. related to the performance criteria.
    - d. Reactions to structure (where applicable).
    - e. Instructions for fabrication, assembly, installation, and interface with other trades.

2. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. Submittal Procedures for Delegated Design Components:

1. Comply with requirements specified for other types of submittals included in this Section, including, but not limited to, form and procedures for delivering submittals.
  - a. Submit delegated design documents for approval prior to fabrication of components included in delegated design work.
  - b. Architect's review of delegated design submittals is for the limited purpose of checking for general conformance with information given and the design intent expressed in the Contract Documents. Architect will review submittals consistent with this limited purpose.
    - 1) Architect's review does not lessen nor shift burden or responsibility from Contractor to Architect or Owner.
    - 2) If during submittal review, Architect notes any deficiencies or errors, submittal will be returned with comments. Otherwise, there will be no responsive action by Architect.
2. Delegated Design Submittal Schedule: Submit list of items identified in the Contract Documents that require delegated design. For each item, include the delegated design entity and the registered design professional.
  - a. If required, submit schedule to the authority having jurisdiction.
3. Preliminary Submission: In order to avoid engineering and detailing of an unacceptable design, and if required by individual technical section, submit to Architect, preliminary documentation describing registered design professional's design prior to preparing engineering calculations and shop drawings.
4. Delegated Design Submission: Submit final delegated design documents to Architect and AHJ if required for review, allowing not less than 10 days for review by Architect, and Architect's consultants and AHJ.
  - a. Comply with AHJ requirements.
  - b. Ensure registered design professional's signed seal is affixed to documents in accordance with jurisdictional requirements.
  - c. Make corrections noted by Architect and comply with AHJ requirements.

1.4 RESPONSIBILITIES

A. General Contractor's Responsibilities:

1. Ensure drawings, calculations, specifications, and other documentation provided by registered design professional are complete and are sealed and signed by the registered design professional in accordance with requirements of AHJ. Architect and Owner shall be entitled to rely on the completeness and accuracy of the documentation provided by the registered design professional.
2. Coordinate and assign complete responsibility for design, documentation, calculations, and submittal of delegated design components.
3. Coordinate components requiring delegated design with adjacent or related systems whether designed by Architect or another entity. Ensure complete, operational systems that perform their intended are provided.
4. When required to be reviewed by AHJ, submit delegated design documentation for in a timely manner that will not negatively impact Project's construction schedule.
5. Performance requirements and design criteria are described in each technical section requiring delegated design. Conduct thorough review of other related portions of the Contract Documents to ensure inclusion of full scope of work in delegated design preparation and submittals.
  - a. Provide products and systems complying with specific performance and design criteria indicated.
6. Comply with quality assurance requirements specified in individual technical sections containing delegated design requirements.
7. Comply with accessibility guidelines, codes, policies, and standards required by the AHJ, applicable to the project, and as indicated.



- B. Registered Design Professional: Responsibilities include, but are not limited to, the following:
  - 1. Sole responsibility to ensure delegated design accommodates all building movements, including, but not limited to deflection, rotation, creep, shrinkage, live loads, wind loads, and loads, interim and otherwise, resulting from means and methods.
  - 2. If applicable, prepare documentation required by AHJ.
  - 3. Prepare delegated design submittals that are sealed and signed by registered design professional.
  
- C. Architect's Responsibilities: Architect will review and mark submittals in accordance with procedures defined in Section 013300 "Submittal Procedures", using the action codes defined in that section.

#### 1.5 SCHEDULING

- A. Schedule delegated design activities and submittals to occur in a timely manner that will not negatively impact Project's construction schedule.
  - 1. Allow sufficient time for Architect's review of delegated design submittals.
  - 2. If Architect's approval of shop drawings relating to delegated design components is required prior to application for permit, schedule and sequence delegated design shop drawing review prior to permit submittal. Comply with requirements of Section 013300 "Submittal Procedures."
  
- B. Owner will not be responsible to pay for delays, additional products, additional hours of work, including overtime, restocking or rework required due to failure by Contractor to coordinate delegated design work with work of other trades.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
  - 1. Section 013573 "Delegated Design Requirements and Procedures" for definitions, submittal procedures, responsibilities, and scheduling requirements associated with delegated design.

1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
  - 1. Mockups are used for one or more of the following:
    - a. Verify selections made under Sample submittals.
    - b. Demonstrate aesthetic effects.
    - c. Demonstrate the qualities of products and workmanship.
    - d. Demonstrate successful installation of interfaces between components and systems.
    - e. Perform preconstruction testing to determine system performance.
  - 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
  - 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

### 1.3 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

### 1.4 ACTION SUBMITTALS

- A. Mockup Shop Drawings:
  - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
  - 2. Indicate manufacturer and model number of individual components.
  - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports and documents as specified.
- D. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

#### 1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, telephone number, and email address of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, telephone number, and email address of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement of whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

#### 1.7 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
  1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. **Testing and Inspecting Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  1. **Contractor's Responsibilities:**
    - a. Provide test specimens representative of proposed products and construction.

- b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
  - d. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
  - e. When testing is complete, remove test specimens and test assemblies, [and ]mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
  2. Build mockups in location indicated or, if not indicated, as directed by Architect.
  3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
  5. Demonstrate the proposed range of aesthetic effects and workmanship.
  6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
  8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  10. Demolish and remove mockups when directed unless otherwise indicated.

## 1.8 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspection will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### 1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
  2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
  6. Retesting and reinspecting corrected Work.

#### PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

##### 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Architect.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.
1. Submit log at Project closeout as part of Project Record Documents.

##### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION



SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
  - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
  - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
  - 3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.

#### 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

#### 1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

#### 2.2 TEMPORARY FACILITIES

- A. Field Offices:
  1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
  1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
  2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
  3. Drinking water and private toilet.
  4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.

5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
6. Wifi with public access capabilities.

- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction. and clean HVAC system as required in Section 017700 "Closeout Procedures."
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## 2.4 PROJECT IDENTIFICATION SIGNS

- A. General:
1. Provide two project identification sign(s). Locate at main site entries here indicated by engineer.
  2. Submit shop drawings for approval showing structure, exact dimensions, copy, confirmation of specified colors and typefaces, and location(s) on site. Receive approval before erection.
  3. Maintain sign(s) until final acceptance of the Work, and repaint sign(s) at least once in each 12-month period.
- B. Sign Construction:
1. Fabricate sign of 3/4 inch minimum thickness, waterproof marine plywood, and 1/4 inch hardwood edge strips with mitered corners.
  2. Include the name of the Owner, the Architect and major Contractor(s) on the sign.
  3. Mount project sign on pressure-preservative-treated wood posts, 4 x 4 inch minimum, set in concrete, with 2 x 4 inch horizontal back bracing to 2 x 6 inch deadman anchors driven into soil.
  4. Anchor field office sign to field office or mount on 2 x 2 inch pressure-preservative-treated wood post set in ground, or otherwise anchored as approved.
  5. Paint fasteners through face of signs to match background.
  6. Provide Sherwin-Williams Co. colors as follows:
    - a. Owner's panel: white, SW 2123 (Exterior).
    - b. Architect's panel: gray, SW 2115 (Exterior).
    - c. Contractor's panel: gray, SW 2115 (Exterior).
    - d. Field office signs: white, SW 2123 (Exterior).
    - e. Type: black, SW 2126 (Exterior).

### PART 3 - EXECUTION

#### 3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

#### 3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area, using HEPA-equipped air-infiltration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  - 3. Perform daily construction cleanup and final cleanup using approved HEPA-filter-equipped vacuum equipment.

#### 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service:
  - 1. Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

- E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
  - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
  
- F. Electric Power Service:
  - 1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
    - a. Install electric power service overhead unless otherwise indicated.
    - b. Connect temporary service to Owner's existing power source, as directed by Owner.
  
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.
  - 1. Provide additional telephone lines for the following:
    - a. Provide one telephone line(s) for Owner's use.
  - 2. At each telephone, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Contractor's emergency after-hours telephone number.
    - e. Architect's office.
    - f. Engineers' offices.
    - g. Owner's office.
    - h. Principal subcontractors' field and home offices.
  
- I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.
  - 1. Wifi Service: modem, router, and ISP, equipped with hardware firewall, providing minimum 10.0-Mbps upload and 15-Mbps download speeds, and internet security.

#### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
  - 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
  - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
  
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
  - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
  - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
  - 3. Delay installation of final course of permanent warm-mix or hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- F. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touch up signs, so they are legible at all times.
- I. Waste Disposal Facilities:
  - 1. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
  - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control:

1. Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection:
  1. Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
  1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
  1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
  3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  4. Insulate partitions to control noise transmission to occupied areas.
  5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  6. Protect air-handling equipment.
  7. Provide walk-off mats at each entrance through temporary partition.

- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
  - 4. Remove standing water from decks.
  - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Periodically collect and remove waste containing cellulose or other organic matter.
  - 4. Discard or replace water-damaged material.
  - 5. Do not install material that is wet.
  - 6. Discard and replace stored or installed material that begins to grow mold.
  - 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
  - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.



- c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### 3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Requirements:
  - 1. Section 015000 "Temporary Facilities and Controls" for temporary controls, utilities, support facilities, temporary site fencing, and, if applicable, temporary erosion and sedimentation controls if not specified in Section 311000 "Site Clearing."
  - 2. Section 311000 "Site Clearing" for removing existing trees and shrubs and for temporary erosion- and sedimentation-control measures if not specified in Section 015000 "Temporary Facilities and Controls."
  - 3. Section 329600 "Transplanting" for relocating existing trees and plants.

1.2 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.
- B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches above the ground line for trees with caliper of 8 inches or greater as measured at a height of 12 inches above the ground.
- C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
    - a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
    - b. Arborist's responsibilities.
    - c. Quality-control program.
    - d. Coordination of Work and equipment movement with the locations of protection zones.
    - e. Trenching by hand or with air spade within protection zones.
    - f. Field quality control.

1.4 ACTION SUBMITTALS

- A. Product Data: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

- B. Shop Drawings:
  - 1. Include plans, elevations, and sections showing trees and plants to be protected, locations of protection-zone fencing and signage, and the relationship between equipment-movement routes and material storage locations with protection zones.
  - 2. Detail fabrication and assembly of protection-zone fencing and signage.
  - 3. Indicate extent of utility boring and trenching by hand or with air spade within protection zones.
- C. Samples: For each type of the following:
  - 1. Organic Mulch: 1-quart volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
  - 2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
- D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
  - 1. Species and size of tree.
  - 2. Location on site plan. Include unique identifier for each.
  - 3. Reason for pruning.
  - 4. Description of pruning to be performed.
  - 5. Description of maintenance following pruning.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- F. Mitigation Requirements: As required by jurisdiction or as developed by arborist, for mitigation of damage to trees and other plantings. Include the following:

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For arborist and tree service firm.
- B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction in accordance with recognized standards and that trees were promptly and properly treated and repaired when damaged.
- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
  - 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 plants designated to remain.
- E. Quality-control program.

#### 1.6 QUALITY ASSURANCE

- A. Arborist Qualifications: Certified Arborist as certified by ISA.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

- C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

#### 1.7 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Moving or parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.
- D. Take precautions to protect plants from airborne contaminants, such as paint or fireproofing overspray.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Backfill Soil: Stockpiled soil mixed with planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
  - 1. Mixture: Well-blended mix of 2 parts stockpiled soil to 1 part planting soil.
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
  - 1. Type: Triple Shredded hardwood.
  - 2. Size Range: 3 inches maximum, 1/2 inch minimum.
  - 3. Color: Natural.
- C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements: Previously used materials may be used when approved by Architect.
  - 1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top rails and 0.177-inch- diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
    - a. Height: 72 inches.
    - b. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches.
    - c.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

#### 3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag or Tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

#### 3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
  - 1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.
  - 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
  - 3. Access Gates: Install as needed for access; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Maintain protection zones free of weeds and trash.
- C. Maintain hydration of plants to assure plant survival.
- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
  - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
  - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

#### 3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones in accordance with requirements in Section 312000 "Earth Moving" unless otherwise indicated.

- B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

### 3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:
  - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
  - 2. Cut Ends: Do not paint cut root ends.
  - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
  - 4. Cover exposed roots with burlap and water regularly.
  - 5. Backfill as soon as possible in accordance with requirements in Section 312000 "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

### 3.6 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.
  - 1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
  - 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
  - 3. Pruning Standards: Prune trees in accordance with ANSI A300.
- B. Unless otherwise directed by arborist and acceptable to Landscape Architect, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.
- E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.
- F. Chip removed branches and dispose of off-site.

### 3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
  - 1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

### 3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

### 3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect.
  - 1. Submit details of proposed pruning and repairs.
  - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours in accordance with arborist's written instructions.
  - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 30 percent dead or in an unhealthy condition or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
  - 1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches or smaller in caliper size.
  - 2. Large Trees: Provide new tree(s) of 4-inch caliper size for each tree being replaced that measures more than 4 inches in caliper size with total replacement rate equal to 50 percent of the tree
  - 3. DBH.
    - a. Species: As selected by Architect.
  - 4. Plant and maintain new trees as specified in Section 329300 "Plants."
- C. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
  - 2. Section 012100 "Allowances" for products selected under an allowance.
  - 3. Section 012300 "Alternates" for products selected under an alternate.
  - 4. Section 012500 "Substitution Procedures" for requests for substitutions.
  - 5. Section 017700 "Closeout Procedures" for submitting warranties.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
  - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
- C. Evaluating Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.



2. Data indicating compliance with the requirements specified in "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

### 1.3 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

- a. Name of product and manufacturer.
- b. Model and serial number.
- c. Capacity.
- d. Speed.
- e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

### 1.4 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.

2. Store products to allow for inspection and measurement of quantity or counting of units.

3. Store materials in a manner that will not endanger Project structure.

4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," "or approved," or "or approved comparable product," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
  - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
  - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
  - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
8. Reference Standards: Where Specifications describe a product by referring to a reference standard without listing product/manufacturer, propose a product that meets the standard. Where additional product description modifies the reference standard, propose a product that meets the standard as modified.

- C. **Product Uniformity:** It is the intent of the documents that the completed construction be uniform through-out the Project. For each type of product, the manufacturer and model shall not vary. After a particular product has been identified and approved for an application, that product shall be used for that application across all the subcontracts and other Work related contracts held by the Contractor. This provision applies equally to accepted substitutions.
- D. **Visual Matching Specification:** Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- E. **Visual Selection Specification:** Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. **Conditions for Consideration of Comparable Products:** Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
  - 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
  - 5. Samples, if requested.
  - 6. By proposing a product that is not listed, for consideration as a comparable product, the Contractor affirms that it meets requirements, except where clearly indicated otherwise. Approval, if granted, will be contingent upon the product meeting requirements as a comparable product. In the absence of clear indication of non-compliance in product submittal, approval of the comparable product by Architect will be based on Contractor's affirmation, whether explicit or implicit.
- B. **Architect's Action on Comparable Products Submittal:** If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for a comparable product. Architect will notify Contractor of approval or rejection of proposed comparable product within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - 1. **Architect's Approval of Submittal:** Marked with approval notation from Architect's action stamp. See Section 013300 "Submittal Procedures."
  - 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering.
  - 3. Installation.
  - 4. Cutting and patching.
  - 5. Progress cleaning.
  - 6. Protection of installed construction.
  - 7. Correction of the Work.
  
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting surveys.
  - 2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

### 1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
  
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

### 1.3 PREINSTALLATION MEETINGS

- A. Layout Conference: Conduct conference at Project site.
  - 1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
    - a. Contractor's superintendent.
    - b. Contractor's personnel responsible for performing Project surveying and layout.
    - c. Professional surveyor responsible for performing site survey serving as basis for Project design.
  - 2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
  - 3. Review requirements for including layouts on Shop Drawings and other submittals.
  - 4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
  
- B. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.

- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

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

#### 1.5 CLOSEOUT SUBMITTALS

- A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

#### 1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Plumbing piping systems.
    - f. Mechanical systems piping and ducts.
    - g. Control systems.
    - h. Communication systems.
    - i. Fire-detection and -alarm systems.
    - j. Conveying systems.
    - k. Electrical wiring systems.
    - l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.[ Other construction elements include but are not limited to the following:]
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
  1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.



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

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

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

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

### 3.2 PREPARATION

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

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

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

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

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

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

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

- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect[ and Construction Manager].

### 3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
  - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

### 3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb, and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

### 3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."

- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
  
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
  
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.

### 3.7 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  
- B. Site: Maintain Project site free of waste materials and debris.
  
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

- D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.8 PROTECTION OF INSTALLED CONSTRUCTION

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

### 3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition waste.
  - 2. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
  - 1. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 14 days of date established for commencement of the Work.

1.5 INFORMATIONAL SUBMITTALS

- A. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

- B. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- C. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- D. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

#### 1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.
- B. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

#### PART 2 - PRODUCTS

#### PART 3 - EXECUTION

##### 3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
  - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

##### 3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.

3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

### 3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.
- C. Burning: Do not burn waste materials.

END OF SECTION



SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final Completion procedures.
  - 3. List of incomplete items.
  - 4. Submittal of Project warranties.
  - 5. Final cleaning.
- B. Related Requirements:
  - 1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
  - 2. Section 013233 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
  - 3. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
  - 4. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 5. Section 017900 "Demonstration and Training" for requirements to train Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 DEFINITIONS

- A. List of Incomplete Items (Punch List): Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
  5. Submit testing, adjusting, and balancing records.
  6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Advise Owner of changeover in utility services.
  6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  8. Complete final cleaning requirements.
  9. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
    - a. If Contractor prematurely submits a request for reinspection, and Architect determines that Project is not substantially complete after second inspection, Owner may charge the Contractor for the cost of additional inspections.

2. Results of completed inspection will form the basis of requirements for Final Completion.

#### 1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
  1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Submit pest-control final inspection report.
  5. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
    - a. If Contractor prematurely submits a request for reinspection, and Architect determines that Project is not complete after second inspection, Owner may charge the Contractor for the cost of additional inspections.

#### 1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  1. Organize list of spaces in sequential order, starting with exterior areas first, listed by room or space number.
  2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

#### 1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  - 1. Submit by uploading to web-based project software site.
- E. Warranties in Paper Form:
  - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - h. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's recommendations.
  - i. Vacuum and mop concrete.
  - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's recommendations if visible soil or stains remain.
  - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - l. Remove labels that are not permanent.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- 3.2 CORRECTION OF THE WORK
- A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory manuals.
  - 2. Emergency manuals.
  - 3. Systems and equipment operation manuals.
  - 4. Systems and equipment maintenance manuals.
  - 5. Product maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.
  - 2. Submit three paper copies. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### 1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
  5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

#### 1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.

6. Name and contact information for Construction Manager.
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Authority.
  9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation in accordance with to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."
- 1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL
- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
  2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
  3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 1.7 EMERGENCY MANUALS
- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.



- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
  - 1. Instructions on stopping.
  - 2. Shutdown instructions for each type of emergency.
  - 3. Operating instructions for conditions outside normal operating limits.
  - 4. Required sequences for electric or electronic systems.
  - 5. Special operating instructions and procedures.

#### 1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
  - 1. Product name and model number. Use designations for products indicated on Contract Documents.
  - 2. Manufacturer's name.
  - 3. Equipment identification with serial number of each component.
  - 4. Equipment function.
  - 5. Operating characteristics.
  - 6. Limiting conditions.
  - 7. Performance curves.
  - 8. Engineering data and tests.
  - 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
  - 1. Startup procedures.
  - 2. Equipment or system break-in procedures.
  - 3. Routine and normal operating instructions.
  - 4. Regulation and control procedures.
  - 5. Instructions on stopping.
  - 6. Normal shutdown instructions.

7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

#### 1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
    - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
    - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
  - G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
  - H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
  - I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
    - 1. Include procedures to follow and required notifications for warranty claims.
  - J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
    - 1. Do not use original project record documents as part of maintenance manuals.
- 1.10 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
  - B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
  - C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
  - D. Product Information: Include the following, as applicable:
    - 1. Product name and model number.
    - 2. Manufacturer's name.
    - 3. Color, pattern, and texture.
    - 4. Material and chemical composition.
    - 5. Reordering information for specially manufactured products.
  - E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
    - 1. Inspection procedures.
    - 2. Types of cleaning agents to be used and methods of cleaning.
    - 3. List of cleaning agents and methods of cleaning detrimental to product.
    - 4. Schedule for routine cleaning and maintenance.
    - 5. Repair instructions.
  - F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
  
- B. Related Requirements:
  - 1. Section 017300 "Execution" for final property survey.
  - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
  - 2. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit Record Digital Data Files and one set of plots.
      - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit three paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned Record Prints and three set(s) of file prints.
      - 3) Print each drawing, whether or not changes and additional information were recorded.
  
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.
  
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
  
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
  
- E. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.3 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Work Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
  2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Architect for resolution.
  4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
    - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Format: Annotated PDF electronic file with comment function enabled.

3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
  - a. Project name.
  - b. Date.
  - c. Designation "PROJECT RECORD DRAWINGS."
  - d. Name of Architect.
  - e. Name of Contractor.

#### 1.4 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
  5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file.

#### 1.5 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file.
  1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

#### 1.6 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
  1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.7 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION



SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.

1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator, or instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  - 1. Inspect and discuss locations and other facilities required for instruction.
  - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  - 3. Review required content of instruction.
  - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

#### 1.5 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Systems and equipment operation manuals.
    - c. Systems and equipment maintenance manuals.
    - d. Product maintenance manuals.
    - e. Project Record Documents.
    - f. Identification systems.
    - g. Warranties and bonds.
    - h. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  - 4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.
    - e. Control sequences.
    - f. Safety procedures.
    - g. Instructions on stopping.
    - h. Normal shutdown instructions.
    - i. Operating procedures for emergencies.
    - j. Operating procedures for system, subsystem, or equipment failure.
    - k. Seasonal and weekend operating instructions.
    - l. Required sequences for electric or electronic systems.
    - m. Special operating instructions and procedures.

5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning.
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

#### 1.6 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### 1.7 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  1. Schedule training with Owner with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

City of Elgin  
Elgin Sports Complex Expansion -  
Phase 1

14106.002  
Issue For Bid  
Not For Construction

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

# **Volume 1 - Site**

City of Elgin  
Elgin Sports Complex Expansion - Phase 1  
14106.002  
Issue For Bid  
Not For Construction

SECTION 033000 - S - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes site cast-in-place concrete.
- B. Comply with latest edition of IDOT per the General Notes.

PART 2 - PRODUCTS

2.1 DRILLED SHAFTS AND FOUNDATIONS

- A. Comply with class D5.

2.2 SLABS, CURBS, ENDWALLS AND WALKS

- A. Comply with class SI.

2.3 OTHER MATERIALS

- A. Comply with IDOT.

2.4 REINFORCEMENT

- A. Comply with IDOT.

PART 3 - EXECUTION

3.1 EXECUTION

- A. Formwork, reinforcing, placement and curing shall comply with IDOT.
- B. All exposed foundations shall receive a rubbed finish.
- C. All exposed flat work and curbs shall receive a broom finish,

END OF SECTION

SECTION 051200 - S - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Site structural steel.
  - 2. Scoreboard columns.
  - 3. Grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 ACTION SUBMITTALS

- A. Product Data sheets and installation details for miscellaneous metal items.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Prepare erection drawings, complete with all necessary plans, elevation and sections, to indicate size and relative position of members. Do not reproduce design drawings for use as erection drawings. Include erection drawings with each submittal indicating marks of all members, assemblies and loose pieces included in the submittal.
  - 2. Indicate on details of all pieces, principal column grid lines where members are located.
  - 3. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 4. Include setting drawings and direction for installation of anchor rods and other anchorages embedded in concrete.
  - 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 7. Indicate surface preparation as per SSPC and prime painting for each member if specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
  - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 2. Tension-control, high-strength bolt-nut-washer assemblies.
  - 3. Welding filler metals and fluxes.
  - 4. Shop primers.
  - 5. Nonshrink grout.
  - 6. Galvanizing.

- F. Fastener Certification.
1. Submit to the inspection and testing agency and the Engineer certified copies of mill test reports for the bolts, nuts and washers from the manufacturer for each shipping lot, complying with the requirements of ASTM A 325/A 325M , ASTM A 563/A 563M, and ASTM F 436/F 436M.
  2. Submit to inspection and testing agency, a certified statement of compliance that high-strength bolts, nuts and washers furnished under this section meets the specified requirements.
  3. Submit to inspection and testing agency, a certified statement of compliance that welding materials furnished under this section meets AWS requirement.

#### 1.5 QUALITY ASSURANCE

- A. Employ a steel erector who has had 5 years of successful experience in erection of structural steel and is able to furnish evidence of erector's ability, facilities, proficiency of erector's personnel and completed projects.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
    - a. Throughout AISC 303, replace "Structural Design Drawings" with "Design Drawings and other Contract Documents".
    - b. Delete paragraph 3.3 – Discrepancies.
    - c. Delete paragraph 4.4 – Approval, and replace with the following:
      - 1) Refer to the Condition of Contract and Section 01330, Submittal Procedures.
      - 2) Review of Shop Drawings by the Engineer shall not relieve the Contractor of responsibility for accuracy of detail dimensions, fit of parts assembled in shop or field, ability to erect the material, or other Contract requirements.
      - 3) Notation by the Engineer made on the Shop Drawings does not authorize changes to the Contract requirements including Contract sum or Contract time.
    - d. Paragraph 4.6 – The RFI Process: Omit reference to "Revision to the Contract Document".
    - e. Delete paragraph 9.3 – Revisions to Contract Documents.
    - f. Paragraph 9.4 – Contract Price Adjustment, replace with the following:
      - 1) Revision to the Contract Documents and Contract Price Adjustment shall be as per the Condition of Contract.
  2. AISC 360.
  3. AWS D1.1 "Structural Welding Code", with the exception as listed in AISC 360-05 specification section J2, apply in lieu of AWS provisions and to the following:
    - a. Delete section 5.3.3.4, "Recrushed Slag"
  4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store 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.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  2. Clean and relubricate bolts and nuts that become dry or rusty before use.



3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.
4. Do not store material on structure that might cause distortion, damage or overload to members or supporting structures. Repair or replace damaged materials or structures as directed by the Engineer.

#### 1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### 1.8 PROJECT CONDITIONS

- A. Measurements:
  1. Make such field measurements as are necessary to lay out the Work properly.

### PART 2 - PRODUCTS

#### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M] .
- B. Channels, Angles, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Welding Filler Materials, Fluxes and Electrodes: Comply with AWS requirements.

#### 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Carbon Steel Bolts: ASTM A 307.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
- C. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
- D. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
  1. Finish: Hot-dip zinc coating
- E. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  1. Configuration: Straight.

2. Nuts: ASTM A 563 hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C

## 2.3 PRIMER

- A. "
- B. Primer: Comply with [Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."] [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]
- C. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- D. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- E. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20

## 2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  1. All provisions of AWS D1.1 apply to welds.
  2. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  3. Mark and match-mark materials for field assembly.
  4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Shop Welding: Perform welding in accordance with approved welding procedures and AWS D1.1, except as modified in Section J2 of AISC 360-05.
  1. Enforce and supervise approved procedure for welding during fabrication of structural steel by employing experienced supervisors knowledgeable of good welding practices.
  2. Assemble and weld built-up sections by method that will maintain true alignment of axes without exceeding tolerance of AISC 303-05.
  3. Remove backing bars or run off tabs, back gouge, and grind smooth as per AWS D1.1 requirements.
- C. High Strength Steel Bolting.
  1. Joints subjected to fatigue load with reversal of loading direction.
  2. Joints installed in oversized holes.
  3. Joints that utilize slotted hole except those with applied load normal to long dimension of the slot.
  4. Joints in which slip at the faying surface would be detrimental to the performance of the structure.

5. Joints in which fastener pretension is required in the governing code or specification.
  6. Joints subjected to load reversal.
  7. Joints subjected to fatigue load with no reversal of loading.
  8. Joints with ASTM A325 or F1852 bolts subjected to tensile fatigue. Joints with ASTM (5) A490 bolts that are subjected to tension, or combined shear and tension, with or without fatigue.
    - a. ST joints are permitted for all other application and should be used whenever possible.
    - b. Mixing of A325 and A490 bolts of same diameter should be avoided to assure that bolts are installed in proper locations.
    - c. Do not use A490 bolts larger than one inch diameter in SC joint as torque required to install these is beyond the commonly available wrenches.
    - d. Coordinate and indicate on drawing joint types.
  9. Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolts and type of joint as indicated.
    - a. Snug tightened joints (ST): Bearing type connections based on allowable stresses with threads included in shear plane (Type N). Faying surfaces and surfaces adjacent to bolt heads and nuts shall be free of dirt and other foreign material.
    - b. Pretensioned joints (PT): Provide PT joints as indicated. Use turn-of Nut (nut rotation from snug-tight condition), calibrated wrench pretensioning, Tension-Control (twist-off) bolt assembly conforming to ASTM F1852, or Direct-Tension Indicator conforming to ASTM F959 as pretensioning method Faying surfaces adjacent to bolt heads and nuts shall be free of dirt and other foreign material.
    - c. Slip-Critical Joints (SC): Provide SC joints as indicated using direct tension indicator conforming to ASTM F959 or Tension-Control (twist-off) bolt assembly conforming to ASTM F1852 and installed according to Section 8 of RSSC. Faying surfaces shall be free of burr, blast cleaned to comply with RCSC Class B requirement.
- D. Anchor Rods (Bolts).
1. Furnish anchor rods (bolts) as indicated to be embedded in concrete, including nuts and washers. Detail anchor rods (bolts) such that the minimum projection above the nut, after the column is in place, is 25 mm (one inch).
- E. Columns and Base Plates.
1. Furnish anchor rods (bolts) as indicated to be embedded in concrete, including nuts and washers. Detail anchor rods (bolts) such that the minimum projection above the nut, after the column is in place, is 25 mm (one inch).
- F. Beams.
1. Provide one-piece beams without splice(s), unless otherwise indicated. Where splices are permitted, splice connections shall develop the strength of the beam.
- G. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- H. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- I. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- J. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP.
- K. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

- L. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- M. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.
- N. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- O. Hollow Structural Steel and Other Closed End Members.
  - 1. Provide hollow structural steel and other closed end members with cap plates with watertight welds at the ends and with weep holes where indicated.
- P. Trusses and Sway Frames.
  - 1. Fabricate trusses as all-welded construction with connections designed in accordance with loads and stresses indicated but in no case less than the requirements of AISC specifications and the following:
    - a. Neutral axes of members: intersect at joints.
    - b. Top and bottom chord of trusses: one piece and without splices unless otherwise indicated.
    - c. Splice connections: meet the approval of the Engineer. No holes drilled in a tension member of a truss.
    - d. Camber: 3 mm per 3 meters (1/8 inch per 10 feet) of span, unless otherwise indicated.
  - 2. Construct sway frames as outlined for trusses.
  - 3. Bracing.
    - a. Provide diagonal bracing, ties and struts as indicated. Design diagonal bracing in the plane of the truss top chord to be welded or clamped to the bottom flange of the purlins. Support bottom chord horizontal bracing members over 6 meters (20 feet) long at approximately mid span by means of 13-mm-diameter (1/2-inch-diameter) rod hangers to purlins above. Detail ties and bracings for draw.
  - 4. Purlins.
    - a. Provide purlins as indicated. Purlins resting on top of trusses or beams may be connected to trusses or beams by means of two 19-mm-diameter (3/4-inch-diameter) machine bolts. Use high strength bolts at all purlin connections which form a part of the bracing system. Provide two- or three-span continuous purlins, with splices staggered on alternate trusses. Provide splice plate at web of purlins with two 19-mm-diameter (3/4-inch-diameter) machine bolts in each purlin, unless otherwise indicated.
- Q. Crane Girders.
  - 1. Maximum horizontal sweep in crane runway girders: 6 mm per 15-meter (1/4 inch per 50'-0") length of girder spans. Maximum camber: plus 6 mm per 15-meter (1/4 inch per 50'-0") girder span over that indicated on the Drawings. Provide flanges of girders for a distance of 450 mm (18 inches) from the ends of the girders free from curvature and normal to girder webs. Align and provide shims at crane girder support to level top of adjacent crane girders.
- R. Rails for Top-Running Crane.

1. Provide crane rails in standard mill length, except at the end of runways in order to stagger joints. Provide minimum rail length of 3 meters (10 feet).
2. Mill or grind ends of the crane rails with no clearance, butted and spliced with joint bars and joint bar bolts conforming to ASTM A449 in reamed holes. Provide a draw fit to insure a tight, smooth joint.
3. Arrange rails so that the joints on opposite sides of crane runway are staggered and rail joints do not occur at crane girder splices.
4. Rail fastening to crane girder: fixed type by Gantrex Corporation. For 20 to 30 kg/m (40 to 60 lb./yd.) crane rail, use rail clip Weldlok 15 with resilient nose. For 42 kg/m (85 lb./yd.) and above, use rail clip Weldlok 43 with resilient nose. Determine clip spacing by the side thrust per wheel, not exceeding 800 mm (32 inches). Install clips in accordance with manufacturer's written requirement.
5. Gage, elevation and alignment of crane rails: accurate to a tolerance of plus or minus 3 mm (1/8 inch).

S. Pins.

1. Provide pins of indicated size which are straight, smooth and free from flaws. Provide pins in length to extend minimum of 6 mm (1/4 inch) beyond the outside faces of the connected parts.

T. Cable Fittings.

1. Attach sockets to cable using prime western, high grade or high purity zinc complying with ASTM B6. Maximum service temperature for zinc fitting: 204 degrees C (400 degrees F.)
2. Attach cable to socket to insure that socket will be stronger than cable. Maximum slip of cable not more than 1/6 of nominal cable diameter when stressed to 80 percent of listed breaking strength.

U. Connections for Other Work.

1. Notify other trades so that holes in structural steel can be provided for attachments where required. Provide necessary holes if information is received prior to fabrication.
2. Make provisions in structural steel for the following:
  - a. Future expansion where shown.
  - b. Connections to existing building where required.
3. Unless otherwise indicated, holes for attachment of wood blocking: 13 mm (1/2 inch) diameter at 600-mm (24-inch) spacing.

## 2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened Pretensioned Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Enforce and supervise approved procedure for welding during fabrication of structural steel by employing experienced supervisors knowledgeable of good welding practices.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
3. Remove backing bars or run off tabs, back gouge and grind smooth as per AWS D1.1 requirements.

## 2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.

3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces on which metal floor deck shear studs are to be welded.
5. Crane rails.
6. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
7. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Primer:

1. Slow Dry Penetrating Shop Prime Coat:
  - a. For shop coat and field touch-up:
    - 1) Tenemec.
    - 2) PPG.
    - 3) Carboline Carbocoat 150 HG.
    - 4) Sherwin Williams.
2. Fast-Dry Prime Coat:
  - a. For shop coat and field touch-up:
    - 1) Tenemec 88HS.
    - 2) ICI Paints 4160.
    - 3) PPG.
    - 4) Carboline Carbocoat 115 SG.
    - 5) Sherwin Williams.
3. Paint for shop coat and field touch-up applied to steel which is to receive field-applied mastic fireproofing: Albi Mfg. Div. of StanChem, Inc. "487S" phenolic alkyd primer or "490W" acrylic, or Carboline Co. "Carboguard 893".

D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

E. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils. Do not apply prime paint when steel or air temperature is below 40 degrees F. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.

## 2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2. Galvanize welded door frames attached to structural-steel frame and located in exterior walls.
3. Safeguard against warpage and distortion during galvanizing in accordance with ASTM A384.
4. Where welding is required after galvanizing, conform to AWS D19.0 – Welding of Zinc Coated Steel. Perform welding in well-ventilated area.
5. On bolts, nuts, and washers: ASTM B695, Class 50.
6. Galvanizing Repair paint: ASTM A780.

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  1. Liquid Penetrant Inspection: ASTM E 165.
  2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  3. Ultrasonic Inspection: ASTM E 164.
  4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

## PART 3 - EXECUTION

### 3.1 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.
  2. Detail the structural steel with a minimum of 1 inch (25 mm) of anchor rod (bolt) thread projecting above the nuts and the base plate hole 1-1/3 times the rod (bolt) diameter. Based on these procedures, the foundations shall be found acceptable if erection can be accomplished within AISC 303-05 tolerances for plumbness and elevation, and with minimum-maximum grout thickness of 1/2 to 2 inches (13 to 50 mm).
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel 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.
- B. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
- C. Design and provide temporary supports, such as guys, bracing, falsework, cribbing or other elements required for steel framework erection, including partly assembled steel framing in consideration of noted interaction items. Design temporary supports to withstand all loads to which the structure may be subjected during erection and subsequent construction, including erection equipment.
- D. Furnish and place all temporary bracing necessary for erection before bolting or welding. Only light drifting will be permitted to draw parts together. Drifting to match unaligned holes will not be permitted. Perform enlargement of holes necessary to make connections resulting from misfit by drilling and reaming; then use the proper size bolt.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Comply with OSHA 29 CFR 1926, and all state, city and municipal laws for steel erection.
- C. Foundation and anchor rods (bolts) are designed for the forces of completed structure. Forces due to erection are the responsibility of the Contractor.
- D. Start steel erection only after concrete in the supporting structure such as footings, piers and walls or mortar in masonry piers and walls has attained minimum 75 percent of intended strength or sufficient strength to support the loads imposed during steel erection.
- E. In planning the method of erection, make full allowance for obstructions encountered which may result from work performed by other trades as well as the operations of the Owner.
- F. In planning the method of plumbing the structure, make allowance for temperature difference between time of erection and mean operating temperature of structure when completed. Take into account differential temperature effects on column lengths in plumbing when tall frames are subjected to strong sun exposure on one side.
- G. Furnish and deliver to the job site anchor rods (bolts), and templates for setting the anchor rods (bolts).
  - 1. Lateral-load-resisting system and connecting diaphragm that provides lateral strength and stability in completed structure.
  - 2. Any special erection considerations that are required by design such as shores, jacks or load that must be adjusted during erection, etc.
- H. All lateral load resistance and stability of the completed structure in each orthogonal direction is provided.
- I. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.



2. Weld plate washers to top of baseplate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- J. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- K. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
  2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- L. Splice members only where indicated.
- M. Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- N. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- 3.4 FIELD CONNECTIONS
- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened Pretensioned Slip critical.
  2. Provide a minimum of two (2) rows of bolts for beam connections. Begin connection near top of the web and extend them down to at least one half (1/2) of distance between web toes of fillet at top and bottom of web.
  3. Provide truss connections to column with symmetrical double angles and bolts designed for eccentricity and prying action. Provide minimum of six (6) high strength bolts for truss to truss or truss to column connection.
  4. ASTM A 307 bolts may be used for secondary members such as girts, door frames, parapet frames, small roof openings (less than 600 mm (2'-0" square) and sag rods.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  2. Field welding will be permitted only where indicated on approved Shop Drawings or where otherwise approved by the Engineer. Perform field welding in accordance with the approved welding procedures and AWS D1.1 except as modified in Section J2 of AISC 360-05.
  3. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  4. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  5. Remove backing bars or runoff tabs, back gouge and grind smooth as per AWS D1.1 requirements.

3.5 PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.7 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" Section 099123 "Interior Painting."

END OF SECTION

SECTION 260400 - S - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Design Intent:

1. The Contract Documents indicate and specify the electrical design intent. The Contract Drawings are schematic and diagrammatic and are not intended to indicate construction details and routing unless specifically indicated. The specifications establish minimum performance, product and installation requirements.
2. In addition to the specified and indicated performance and quality requirements, furnish products and perform installation work consistent with the design intent, industry standards and as necessary to the provision of complete operating electrical systems.
3. Install electrical work in accordance with the National Electrical Code and all applicable local codes in a neat and workmanlike manner.
4. This Section specifies basic electrical requirements applicable to all Divisions unless explicitly excepted.
5. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.
6. Contractor shall thoroughly review entire set of Contract Documents, including all discipline drawings and specifications prior to bidding and include all required electrical work in bid, even if not explicitly shown on electrical Drawings and Specifications.
7. The project is pursuing LEED certification. Contractor shall provide requirements in compliance with LEED standards as identified in the Contract Documents.

1.2 REFERENCES

- A. American National Standards Institute (ANSI) C2 - National Electrical Safety Code.
- B. City of Elgin Ordinances.
- C. State of Illinois Codes.
- D. National Electrical Contractors Association (NECA).
  1. 1 - Standard for Good Workmanship in Electrical Construction.
  2. 500 - Recommended Practice for Installing Indoor Commercial Lighting Systems.
- E. National Fire Protection Association (NFPA).
  1. 70 - National Electrical Code (NEC).
  2. 70E - Standard for Electrical Safety in the Workplace.
  3. 72 - National Fire Alarm and Signaling Code.
  4. 101 - Life Safety Code.
  5. 111 - Standard for Stored Electrical Energy Emergency and Standby Power Systems.
- F. Leadership in Energy and Environmental Design (LEED).
  1. Interior Design and Construction (ID+C) v4 - Commercial Interiors.

1.3 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Provide products suitable for operation under the following environmental conditions:

- a. Temperature: -18 to 38 degrees C (0 to 100 degrees F).
- b. Humidity: 0 to 95 relative percent, non-condensing.
- c. Altitude: 2010 meters (6600 feet) above sea level.
- d. Outdoor: Products that are UL listed for wet locations.

#### 1.4 WARRANTIES

- A. Refer to the Conditions of the Contract for provisions concerning Contract general warranty, Statements of Compliance, correction of Work period, and form of Special Warranty.
- B. All electrical systems, equipment and installations shall be provided with a one-year minimum Warranty starting from the date of substantial completion.
- C. During the warranty period, and for non-conformities the contractor shall take all necessary and appropriate action; free of charge, to correct any non-conformity with the warranties contained in the manufacturer agreement. During the warranty period, contractor shall provide to Owner, free of costs and charges, all support necessary to ensure that the installation meets the requirements specified in the Contract Documents and performance guarantees provided by the contractors. During the warranty period, contractors shall furnish, or cause to be furnished, all maintenance, service, parts and replacements necessary to maintain the installation in good working condition, at no cost to Owner.

#### 1.5 CONDUCTOR SIZING

- A. Feeder and Branch Circuit Sizing
  1. Provide feeder and branch circuits per the circuit sizing schedules indicated on Drawings. Where schedules are not indicated, provide conductors which are sized as required per the NEC for the indicated overcurrent protective device rating. Circuit sizing and installation shall consider the field routing and anticipated voltage drop. Upsize wire, as necessary, to compensate for voltage drop and/or other forms of derating required in accordance with the NEC.
  2. Derate conductor ampacities per the NEC for field conditions including but not limited to conduits exposed to sunlight, elevated ambient temperature, and/or more than 3 current carrying conductors in a raceway.

#### 1.6 SYSTEMS INTEGRATION

- A. Coordinate with equipment suppliers and ensure integration of systems comprised of disparate equipment which work together to form a complete system.
- B. Provide all miscellaneous components, wiring, hardware, etc. required for complete and operational equipment and systems whether or not these items are explicitly shown in the Contract Documents.
- C. Provide systems which maintain the UL rating of the individual pieces of equipment.
- D. Submit system integration wiring diagrams, control diagrams and sequence of operation, as needed.

#### 1.7 COORDINATION

- A. Contractor shall participate in the project scheduling, coordination meetings and coordination drawing/modeling activities as specified in Division 01.
- B. All potential coordination issues shall be brought to the attention of the Construction Manager immediately before proceeding with the installation.
- C. Contractor shall be responsible for all cross connecting and coordination with vendors and other trade contractors to provide complete operational systems.

- D. For purpose of clarify and legibility, drawings are diagrammatic. Locate equipment as close as practical to the locations shown on the drawings. Should field conditions prevent the installation of equipment or materials as indicated on the drawings, make deviations only with the prior approval of the Owner's representative.
- E. 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 at required slope.
  - 4. To allow connecting raceways, cables, wireways, cable trays, and busways to be clear of obstructions and of the working and access space of other equipment.
- F. Coordinate work with other trades to ensure completion is consistent with the project schedule. Ensure the NEC-required working space and dedicated electrical space about electrical equipment is provided. Foreign systems shall not be located within these dedicated zones. Any work that encroaches on the working space or dedicated electrical space shall be relocated at the Contractor's expense.
- G. Equipment and device mounting heights and alignment shall adhere to architectural drawings, rules and requirements. Devices of all trades within the same general area shall be coordinated prior to construction. Care shall be taken to align devices horizontally and vertically. Devices that are not aligned properly shall be relocated at the Contractor's expense.
- H. Coordinate exact conduit routing in the field with other trades and with building elements such as structural steel members. Conduit and raceways are not explicitly shown. Conduit routing where shown on drawings shall be considered approximate. Contractor shall be responsible for final routing in the field and shall be responsible for complete coordination with all other trades.
- I. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- J. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 8.
- K. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07.

## PART 2 - PRODUCTS

## PART 3 - EXECUTION

### 3.1 SHUTDOWNS

- A. Interruption of Existing Service: Do not interrupt electric, communications or fire alarm 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 Engineer, Construction Manager and Owner no fewer than seven days in advance of proposed interruption of service.
  - 2. Indicate method of providing temporary service.
  - 3. Do not proceed with interruption of service without Engineer's, Construction Manager's and Owner's written permission.
  - 4. Comply with NFPA 70E.

- B. Coordinate all service interruptions with other disciplines and Owner's representative. Shutdowns shall be performed during off hours, which may include weekends or holidays. This premium time cost shall be included in the Contractor's base bid.
- C. Maintain Owner communications and network services operations during construction. Coordinate all service interruptions with other disciplines and Owner's representative.

### 3.2 DEMOLITION

- A. Protect adjacent building services and materials indicated to remain. Install and maintain barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition is complete.
- B. "Carefully remove, clean and restore and reinstall items that are relocated during construction to a "like new" condition.
- C. Building elements such as walls, partitions, floors and ceilings affected by electrical construction such as conduit penetrations shall be repaired, patched, painted and otherwise restored to a "like new" condition.
- D. Lamp and Ballast Recycling.
  - 1. Recycle lamps, ballasts and drivers containing hazardous materials such as mercury during construction. These shall include tubular fluorescent, compact fluorescent, HID, LED, induction and cold cathode lamps. These lamp types, ballasts and drivers associated with these lamps shall not be disposed of as solid municipal waste.
- E. Equipment Protection and Cleanup.
  - 1. Protect equipment and materials during shipment, storage and construction against damage, dust and contamination. Items that become damaged, dirty or contaminated during construction shall be restored to a "like new" condition or replaced at the Contractor's expense.
  - 2. Remove and legally dispose of demolished items, rubbish, debris and construction waste from the construction site daily, and at the completion of the work. The contractor shall maintain a "clean" work site. Failure to do so may result in the cleanup being performed by others and all costs thereof being deducted from the Contractor's final payment.

### 3.3 INSTALLATION

- A. General
  - 1. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless otherwise indicated.
  - 2. 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.
  - 3. 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.
  - 4. Right of Way: Give to piping systems installed at a required slope.
- B. Wiring Installation
  - 1. Install wiring for control systems, power feeder and branch circuits, lighting branch circuits, communication and auxiliary systems, such as fire alarm and security, in separate raceways unless otherwise indicated.
  - 2. .

3. Prior to rough-in of electrical and telecommunications devices, verify locations with the owner's final furniture plans and the system supplier's approved installation drawings. Adjust locations of devices to coordinate with furniture and equipment layouts.
- C. Device Location
1. Allow for relocation prior to installation of wiring devices and other control devices, for example, receptacles, switches, occupancy sensors, fire alarm devices and access control devices, within a 10-foot radius of indicated location without additional cost.
  2. Refer to architectural plans for device location, mounting and alignment rules and requirements. Coordinate all device and lighting fixture placement with other trades prior to rough-in.
  3. Devices in proximity to each other shall be horizontally and vertically aligned. Devices which are not aligned properly shall be relocated as required to meet alignment requirements at no cost to Owner.
  4. Coordinate device placement and installation with other trades and Engineer prior to construction and rough-in.
- D. NECA Compliance
1. Install products in accordance with applicable NECA Standards, unless otherwise specified or indicated.
- E. Wet, Damp, or Dry Location Work
1. Provide products as appropriate for wet, damp, or dry locations as defined by NFPA 70.
- F. Manufacturer Installation Instructions
1. Install equipment in accordance with the manufacturer's installation instructions and recommendations.
- G. Fire and Smoke Barrier Penetrations
1. Install firestopping to raceways, boxes and electrical equipment installed in or penetrating fire-rated floor and wall assemblies and smoke barrier assemblies, in a manner which maintains the fire resistance rating or barrier intent.
- H. Field Painting
1. Field paint electrical equipment, products, materials, components and systems where indicated.
  2. In a manner approved by the manufacturer and satisfactory to the Owner, touch-up or refinish factory-applied paints or finishes which are chipped, defaced, scratched, or in any other way disturbed due to handling, installation, or general construction work.
- I. Exposed Construction
1. Take care in areas where the installation is exposed and visible to the public. Install electrical systems and equipment in an organized fashion and field painted. Mounting surfaces shall be repaired, patched, and painted to provide a "like new" appearance.
  2. Coordinate systems (e.g. conduit, cable tray, wiring, duct work, piping, hanger, supports, etc.) prior to installation.
- J. Personnel Protection from Suspended Work
1. Where suspended equipment, piping or ductwork or any of their supporting or reinforcing members extend 2.1 meters (7 feet) or less above the floor or any other walking surface, cover all edges, projecting surfaces and sharp corners with pre-fabricated soft rubber pads, elastomeric insulation, caps or equivalent to prevent injury to personnel.
- K. Feeder and Branch Circuit Sizing
1. Provide feeder and branch circuit sizing per schedules indicated on drawings.

### 3.4 ACCEPTANCE TESTING

#### A. General.

1. Provide necessary test equipment and be responsible for setting-up test equipment, wire checks of factory wiring and any other preliminary work in preparation for the electrical acceptance tests.
2. Perform tests which do not exceed the manufacturer's recommended limit for the equipment being tested.
3. Where required for the validity of tests or safety of equipment and personnel, isolate equipment to be tested from the system.
4. Include the ambient temperature and relative humidity existing at the time when performing insulation resistance, dielectric absorption or high potential tests.
5. Coordinate testing and inspections with commissioning agent.

#### B. Visual Inspections.

1. Prior to any testing, perform visual inspections to verify the following:
  - a. The equipment is completely and properly installed.
  - b. The equipment is free from damage and defects.
  - c. Shipping blocks and restraints have been removed.
  - d. Electrical terminations are properly tightened.
  - e. The equipment is properly aligned.
  - f. The equipment is properly lubricated.
  - g. The ventilation louvers are open and unobstructed.
  - h. The equipment is ready to be tested.

#### C. Manual Operation.

1. Prior to any testing, operate mechanical devices to verify that they function properly and freely.

#### D. Insulation Resistance Test.

1. Perform test with a voltage source capable of providing a constant direct voltage for the time intervals as specified below.
  - a. 150 volts and under - 500 volts.
  - b. 151-600 volts - 1000 volts.
  - c. Hold 1000-volt and 500-volt insulation resistance tests for a minimum of one minute or until the reading reaches a constant value for 15 seconds unless specified otherwise.
  - d. Apply tests from phase to ground with the other phases grounded. Test each phase in a similar manner.
  - e. Check phase matching and phase identification immediately prior to energizing equipment.

### 3.5 CLEANING

- A. Clean electrical equipment and systems to remove dirt, paint or other foreign materials and restore to match original condition and finish upon completion of construction.

### 3.6 TRAINING

#### A. General

1. Provide training for Owner's personnel in the operation and maintenance of equipment as specified in the applicable Section for the particular equipment and system.
2. Develop training schedule which is acceptable to the Owner. Submit schedule for approval.
3. Provide instruction books, manuals, and other classroom material required as part of the training sessions.
4. Provide instructors who are certified by the equipment and system manufacturers.
5. Provide training for a minimum of three of the Owner's personnel, or as specified in the applicable Section.



6. Conduct training at Project Site after the equipment/system has been installed.
- B. Operations and Maintenance Training
1. Train personnel in all aspects of normal operation of the equipment, including starting, adjustments while running, and shutdown.
    - a. Train personnel to recognize incipient problems, including inefficient or dangerous modes of operation, and provide instruction in corrective actions to be taken.
  2. Train personnel to perform all recommended maintenance on the equipment.

END OF SECTION

SECTION 260519 - S - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.2 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Standards:
  - 1. Products listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. RoHS compliant.
  - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide"

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpha Wire Company.
  - 2. American Bare Conductor.
  - 3. Belden Inc.
  - 4. Cerro Wire LLC.
  - 5. Encore Wire Corporation.
  - 6. General Cable Technologies Corporation.
  - 7. Okonite Company (The).
  - 8. Service Wire Co.
  - 9. Southwire Company.
  - 10. WESCO.
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 and ASTM B 496 for stranded conductors.
- D. Conductor Insulation:
  - 1. Refer to Part 3 for conductor insulation application. Comply with UL Standard appropriate for cable insulation.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M Electrical Products.
  - 2. AFC Cable Systems; a part of Atkore International.
  - 3. Gardner Bender.
  - 4. Hubbell Power Systems, Inc.
  - 5. Ideal Industries, Inc.
  - 6. ILSCO.
  - 7. NSi Industries LLC.
  - 8. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - 9. Service Wire Co.
  - 10. TE Connectivity Ltd.
  - 11. Thomas & Betts Corporation; A Member of the ABB Group.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  - 1. Material: Bronze or matching conductor material.

### PART 3 - EXECUTION

#### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

#### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2 or XHHW-2, single conductors in raceway. Cabling must meet ComEd requirements.
- B. Feeders: Type THHN/THWN-2 or XHHW-2, single conductors in raceway.
- C. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2 or XHHW-2, single conductors in raceway .

#### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. 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.

- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Install cable per manufacturer's recommendations.

#### 3.4 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-486B.
- B. Make splices, terminations, 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.

#### 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

#### 3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

#### 3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative for the Athletic Field Lighting.
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements: Athletic Field Lighting Circuits
  - 2. Perform each of the following visual and electrical tests:
    - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    - b. Test bolted connections for high resistance using one of the following:
      - 1) A low-resistance ohmmeter.
      - 2) Calibrated torque wrench.
      - 3) Thermographic survey.
    - c. Inspect compression-applied connectors for correct cable match and indentation.
    - d. Inspect for correct identification.
    - e. Inspect cable jacket and condition.
    - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    - g. Continuity test on each conductor and cable.
- B. Cables will be considered defective if they do not pass tests and inspections.

- C. Prepare test and inspection reports to record the following:
1. Procedures used.
  2. Results that comply with requirements.
  3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 260526 - S - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Burndy; Part of Hubbell Electrical Systems.
  - 2. ERICO International Corporation.
  - 3. Galvan Industries, Inc.; Electrical Products Division, LLC.
  - 4. ILSCO.
  - 5. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - 6. Robbins Lightning, Inc.
  - 7. Siemens Power Transmission & Distribution, Inc.
  - 8. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-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. Bonding Conductor: No. 6 AWG, minimum, stranded conductor.
  - 4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart, unless otherwise indicated or specified. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.
- D. Lead Content: Less than 300 parts per million.

2.4 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. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

- D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- E. Conduit Hubs: Mechanical type, terminal with threaded hub.
- F. Ground Rod Clamps: Mechanical type, copper or copper alloy.
- G. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- H. Water Pipe Clamps:
  - 1. Mechanical type, two pieces with zinc-plated or stainless-steel bolts.
    - a. Material: Die-cast zinc alloy.
    - b. Listed for direct burial.
  - 2. U-bolt type with malleable-iron clamp and copper ground connector.

## 2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad; 5/8 by 96 inches.

## PART 3 - EXECUTION

### 3.1 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 below grade.
- C. 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.

### 3.2 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.

### 3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Ground separately-derived ac power system neutrals, including distribution transformers, to the grounding electrode system per NFPA 70 and as indicated on Drawings.

### 3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.

- B. 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 from the foundation. Utility company transformer and switches must comply with all utility company grounding standards.

### 3.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. 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.
- C. Metallic Fences: Comply with requirements of IEEE C2.
  - 1. Grounding Conductor: Bare copper or tinned copper, not less than 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.

### 3.6 FENCE GROUNDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:
  - 1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
    - a. Gates and Other Fence Openings: Ground fence on each side of opening.
      - 1) Bond metal gates to gate posts.
      - 2) Bond across openings, with and without gates, except at openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.
- C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
- D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
- E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- F. Bonding to Lightning-Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780. Coordinate bonding to any LPS systems if provided on any of the site buildings.

### 3.7 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 Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 24 inches 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. Use exothermic welds for all below-grade connections.
  - 3. 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.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
  - 1. 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.
- E. 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.
- F. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, 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.
- 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 apart.
- H. 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 No. 2/0 AWG for ground ring and for taps to building steel.
  - 2. Bury ground ring not less than 24 inches from building's foundation.
- I. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
  - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.

2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to 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, at ground test wells, 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. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
  5. Substations and Pad-Mounted Equipment: 5 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 260533 - S - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Metal conduits and fittings.
  2. Nonmetallic conduits and fittings.
  3. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Sustainable Design Submittals:
1. Product Data: For solvents and adhesives, indicating VOC content.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Allied Tube & Conduit; a part of Atkore International.
    - c. Anamet Electrical, Inc.
    - d. Calconduit.
    - e. Electri-Flex Company.
    - f. FSR Inc.
    - g. O-Z/Gedney; a brand of Emerson Industrial Automation.
    - h. Republic Conduit.
    - i. Southwire Company.
    - j. Thomas & Betts Corporation; A Member of the ABB Group.
    - k. Topaz Electric; a division of Topaz Lighting Corp.
    - l. Western Tube and Conduit Corporation.
    - m. Wheatland Tube Company.
  2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  3. GRC: Comply with ANSI C80.1 and UL 6.
  4. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
    - a. Comply with NEMA RN 1.
    - b. Coating Thickness: 0.040 inch, minimum.
  5. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
1. Manufacturers: As specified above.
  2. Comply with NEMA FB 1 and UL 514B.
  3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  4. Fittings, General: Listed and labeled for type of conduit, location, and use.

5. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
  6. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS AND FITTINGS

### A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AFC Cable Systems; a part of Atkore International.
  - b. Anamet Electrical, Inc.
  - c. Arnco Corporation.
  - d. CANTEX INC.
  - e. CertainTeed Corporation.
  - f. Electri-Flex Company.
  - g. Kraloy.
  - h. RACO; Hubbell.
  - i. Thomas & Betts Corporation; A Member of the ABB Group.
  - j. Topaz Electric; a division of Topaz Lighting Corp.
2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

### B. Nonmetallic Fittings:

1. Manufacturers: As specified above.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
  - a. Fittings for LFNC: Comply with UL 514B.
4. Solvents and Adhesives: As recommended by conduit manufacturer.
5. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

## 2.3 BOXES, ENCLOSURES, AND CABINETS

### A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crouse-Hinds, an Eaton business.
2. Erickson Electrical Equipment Company.
3. Hoffman; a brand of Pentair Equipment Protection.
4. Hubbell Incorporated.
5. Hubbell Incorporated; Wiring Device-Kellems.
6. O-Z/Gedney; a brand of Emerson Industrial Automation.
7. RACO; Hubbell.
8. Spring City Electrical Manufacturing Company.
9. Thomas & Betts Corporation; A Member of the ABB Group.
10. Wiremold / Legrand.

- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- G. Gangable boxes are allowed.
- H. Cabinets:
  - 1. NEMA 250, Type 3R 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.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC.
  - 2. Concealed Conduit, Aboveground: GRC.
  - 3. Underground Conduit: Type EPC-40-PVC or EPC-80 PVC direct buried or concrete encased as indicated. See 26 05 43 "UNDERGROUND DUCTS AND RACEWAYS".
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Minimum Raceway Size: 2-inch trade size.
- C. 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. Comply with NEMA FB 2.10.
  - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- D. Install surface raceways only where indicated on Drawings.

### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- C. Do not fasten conduits onto the bottom side of a metal deck roof.
- D. 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.
- E. Complete raceway installation before starting conductor installation.
- F. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- G. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- H. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- I. Support conduit within 12 inches of enclosures to which attached.
- J. 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. Secure raceways to reinforcement at maximum 10-foot intervals.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
  - 4. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.
- K. Stub-Ups to Above Recessed Ceilings:
  - 1. Use RMC for raceways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- L. 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.
- M. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

- P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- R. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- S. 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. Cap underground raceways designated as spare above grade alongside raceways in use.
  - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
  - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- T. Install raceway sealing fittings at accessible locations according to NFPA 70 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 according to NFPA 70.
- U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Conduit extending from interior to exterior of building.
  - 4. Where otherwise required by NFPA 70.
- V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- W. Expansion-Joint Fittings:
  - 1. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
  - 2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  - 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, 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.
- Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

- Z. 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. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- BB. Locate boxes so that cover or plate will not span different building finishes.
- CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- EE. Set metal floor boxes level and flush with finished floor surface.

### 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. "

### 3.4 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

### 3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION



SECTION 260543 - S - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Metal conduits and fittings, including GRC and PVC-coated steel conduit.
  - 2. Rigid nonmetallic duct.
  - 3. Duct accessories.
  - 4. Fiberglass handholes and boxes with polymer concrete cover.

1.2 DEFINITIONS

- A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.
- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
  - 1. Two or more ducts installed in parallel, with or without additional casing materials.
  - 2. Multiple duct banks.
- D. GRC: Galvanized rigid (steel) conduit.
- E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include duct-bank materials, including spacers and miscellaneous components.
  - 2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
  - 3. Include accessories for manholes, handholes, boxes, and other utility structures.
  - 4. Include underground-line warning tape.

1.4 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:
  - 1. Notify Construction Manager and Owner no fewer than five days in advance of proposed interruption of electrical service.
  - 2. Do not proceed with interruption of electrical service without Construction Manager's and Owner's written permission.
- B. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.
- C. Ground Water: Assume ground-water level is 36 inches below ground surface unless a higher water table is noted on Drawings.

## PART 2 - PRODUCTS

### 2.1 RIGID NONMETALLIC DUCT

- A. Underground Plastic Utilities Duct: Type EPC-80-PVC and Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ARNCO Corp.
  - 2. Beck Manufacturing.
  - 3. CANTEX INC.
  - 4. CertainTeed Corporation.
  - 5. Condux International, Inc.
  - 6. Crown Line Plastics.
  - 7. ElecSys, Inc.
  - 8. Electri-Flex Company.
  - 9. Endot Industries Inc.
  - 10. IPEX USA LLC.
  - 11. Lamson & Sessions.
  - 12. Manhattan/CDT.
  - 13. National Pipe & Plastics.
  - 14. Opti-Com Manufacturing Network, Inc (OMNI).
  - 15. Spiraduct/AFC Cable Systems, Inc.
- C. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
- D. Solvents and Adhesives: As recommended by conduit manufacturer.

### 2.2 DUCT ACCESSORIES

- A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used, and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; a part of Atkore International.
    - b. CANTEX INC.
    - c. Carlon; a brand of Thomas & Betts Corporation.
    - d. IPEX USA LLC.
    - e. PenCell Plastics.
    - f. Underground Devices, Inc.
- B. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."
- C. Concrete Warning Planks: Nominal 12 by 24 by 3 inches in size, manufactured from 6000-psi concrete.
  - 1. Color: Red dye added to concrete during batching.
  - 2. Mark each plank with "ELECTRIC" in 2-inch- high, 3/8-inch- deep letters.

2.3 FIBERGLASS HANDHOLES AND BOXES WITH POLYMER CONCRETE FRAME AND COVER

- A. Description: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following]:
  - 1. Armorcast Products Company.
  - 2. Christy Concrete Products.
  - 3. Oldcastle Enclosure Solutions.
  - 4. Quazite: Hubbell Power Systems, Inc. (B.O.D)
- C. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.
- D. Color: Gray or Green. Provided to match surrounding surface.
- E. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
- F. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
- G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- H. Cover Legend: Molded lettering, "ELECTRIC", "FIBER" as indicated for each service.
- I. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
- J. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.
- K. Handholes 12 inches wide by 24 inches long and larger shall have factory-installed inserts for cable racks and pulling-in irons.

2.4 SOURCE QUALITY CONTROL

- A. Test and inspect precast concrete utility structures according to ASTM C 1037.
- B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
  - 1. Strength tests of complete boxes and covers shall be by an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
  - 2. Testing machine pressure gages shall have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Engineer if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Engineer.
- C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Section 311000 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 311000 "Site Clearing."

#### 3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Electrical Cables More Than 600 V: Type EPC-80-PVC RNC, concrete-encased unless otherwise indicated or to meet ComEd utility requirements
- B. Duct for Electrical Feeders 600 V and Less: Type EPC-80-PVC RNC, direct-buried unless otherwise indicated.
- C. Bored Underground Duct: Type EPEC-80-HDPE unless otherwise indicated. Utilized for areas where crossing obstructions such as beneath existing roadways.
- D. Underground Ducts Crossing Paved Paths, Walks, and Driveways Roadways: Type EPC-40 PVC RNC, encased in reinforced concrete.
- E. Stub-ups: Concrete-encased GRC.

#### 3.3 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes and Boxes for 600 V and Less:
  - 1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-10 structural load rating.
  - 2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Fiberglass enclosures with polymer concrete frame and cover, SCTE 77, Tier 15 structural load rating.
  - 3. Units in Sidewalk and Similar Applications and areas with light duty pedestrian traffic, all with a Safety Factor for Nondeliberate Loading by Vehicles: or Heavy-duty fiberglass units with polymer concrete frame and cover, SCTE 77, Tier 8 structural load rating.
  - 4. Cover design load shall not exceed the design load of the handhole or box.

#### 3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

- B. Restoration: Replace area after construction vehicle traffic in immediate area is complete.
- C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with earthwork and exterior improvement specifications.

### 3.5 DUCT AND DUCT-BANK INSTALLATION

- A. Install duct, spacers, and accessories into the duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
- B. Install duct according to NEMA TCB 2.
- C. Slope: Pitch duct a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from a high point between two manholes, to drain in both directions.
- D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations unless otherwise indicated.
  - 1. Duct shall have maximum of two 90 degree bends or the total of all bends shall be no more 180 degrees between pull points.
- E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.
- F. Installation Adjacent to High-Temperature Steam Lines: Where duct is installed parallel to underground steam lines, perform calculations showing the duct will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.
- G. Terminator Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inches o.c. for 4-inch duct, and vary proportionately for other duct sizes.
  - 1. Begin change from regular spacing to terminator spacing 10 feet from the terminator, without reducing duct line slope and without forming a trap in the line.
  - 2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line duct with calculated expansion of more than 3/4 inch.
- H. Building Wall Penetrations: Make a transition from underground duct to GRC at least 10 feet outside the building wall, without reducing duct line slope away from the building and without forming a trap in the line. Use fittings manufactured for RNC-to-GRC transition.
- I. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- J. Pulling Cord: Install 200-lbf- test nylon cord in empty ducts.
- K. Concrete-Encased Ducts and Duct Bank:

1. Excavate trench bottom to provide firm and uniform support for duct. Prepare trench bottoms as specified in Section 312000 "Earth Moving" for pipes less than 6 inches in nominal diameter.
  2. Width: Excavate trench 12 inches wider than duct on each side.
  3. Depth: Install so top of duct envelope is at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.
  4. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
  5. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
  6. Minimum Space between Duct: 3 inches between edge of duct and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and communications ducts.
  7. Elbows: Use manufactured GRC elbows for stub-ups, at building entrances, and at changes of direction in duct run.
    - a. Couple RNC duct to GRC with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    - b. Stub-ups to Outdoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
      - 1) Stub-ups shall be minimum 4 inches above finished floor and minimum 3 inches from conduit side to edge of slab
    - c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of wall. Install insulated grounding bushings on terminations at equipment.
      - 1) Stub-ups shall be minimum 4 inches above finished floor and no less than 3 inches from conduit side to edge of slab
  8. Reinforcement: Reinforce concrete-encased duct where crossing disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
  9. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
  10. Concrete Cover: Install a minimum of 3 inches of concrete cover between edge of duct to exterior envelope wall, 2 inches between duct of like services, and 4 inches between power and communications ducts.
  11. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
    - a. Start at one end and finish at the other, allowing for expansion and contraction of duct as its temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written instructions, or use other specific measures to prevent expansion-contraction damage.
    - b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing-rod dowels extending a minimum of 18 inches into concrete on both sides of joint near corners of envelope.
  12. Pouring Concrete: Place concrete carefully during pours to prevent voids under and between duct and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Allow concrete to flow around duct and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-installation application.
- L. Direct-Buried Duct and Duct Bank:
1. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inches in nominal diameter.

2. Width: Excavate trench 6-12 inches wider than duct on each side.
  3. Depth: Install top of duct at least 36 inches below finished grade unless otherwise indicated.
  4. Set elevation of bottom of duct bank below frost line.
  5. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
  6. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
  7. Install duct with a minimum of 3 inches between ducts for like services and 6 inches between power and communications duct.
  8. Install manufactured GRC elbows for stub-ups, at building entrances, and at changes of direction in duct.
    - a. Couple RNC duct to GRC with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    - b. Stub-ups to Outdoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
      - 1) Stub-ups shall be minimum 4 inches above finished floor and minimum 3 inches from conduit side to edge of slab
    - c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches from edge of wall. Install insulated grounding bushings on terminations at equipment.
      - 1) Stub-ups shall be minimum 4 inches above finished floor and no less than 3 inches from conduit side to edge of slab
  9. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.
    - a. Place minimum 3 inches of sand as a bed for duct. Place sand to a minimum of 6 inches above top level of duct.
    - b. Place minimum 6 inches of engineered fill above concrete encasement of duct.
- M. Underground-Line Warning Tape: Bury conducting underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inches above all concrete-encased duct and duct banks and approximately 12 inches below grade. Align tape parallel to and within 3 inches of centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.
- 3.6 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE
- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.
  - 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 and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.

- D. Install handholes and boxes with bottom below frost line, minimum of 24" depth, whichever is greater. below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
- F. Field cut openings for duct 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.
- G. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on compacted earth.
  - 1. Concrete: 3000 psi, 28-day strength, with a troweled finish.
  - 2. Dimensions: 10 inches wide by 12 inches deep.

### 3.7 GROUNDING

- A. Ground underground ducts and utility structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

### 3.8 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump.
  - 1. Sweep floor, removing dirt and debris.
  - 2. Remove foreign material.

END OF SECTION



SECTION 260553 - S - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded conductors.
  - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
  - 2. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  - 3. Colors for 240-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
  - 4. Colors for 480/277-V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.

- c. Phase C: Yellow.
- 5. Color for Neutral:
  - a. 208/120-V or 120/240-V Circuits: White.
  - b. 480/277-V Circuits: Grey.
- 6. Color for Equipment Grounds: Green.
- 7. Colors for Isolated Grounds: Green with two or more yellow stripes.

- C. Raceways and Cables Carrying Circuits at More Than 600 V:
  - 1. Black letters on an orange field.
  - 2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

- D. Warning Label Colors:
  - 1. Identify system voltage with black letters on an orange background.

- E. Warning labels and signs shall include, but are not limited to, the following legends:
  - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

- F. Equipment Identification Labels:
  - 1. Black letters on a white field.

## 2.3 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the following:
  - 1. Brady Corporation.
  - 2. Carlton Industries, LP.
  - 3. Champion America.
  - 4. emedco.
  - 5. Hellermann Tyton
  - 6. Ideal Industries, Inc.
  - 7. LEM Products Inc.
  - 8. Marking Services, Inc.
  - 9. Panduit Corp.
  - 10. Seton Identification Products.

## 2.4 LABELS

- A. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- thick, polyester flexible label with acrylic pressure-sensitive adhesive.
  - 1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
  - 2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- B. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
  - 1. Minimum Nominal Size:
    - a. 1-1/2 by 6 inches for raceway and conductors
    - b. 3-1/2 by 5 inches for equipment.
    - c. As required by authorities having jurisdiction.

## 2.5 TAPES AND STENCILS

- A. Underground-Line Warning Tape:

1. Tape:
  - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
2. Color and Printing:
  - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
  - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE" .
  - c. Inscriptions for Orange-Colored Tapes: "FIBER CABLE" .
3. Tag: Type ID:
  - a. 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, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Overall Thickness: 5 mils.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 28 lb/1000 sq. ft..
  - f. Tensile according to ASTM D 882: 70 lbf and 4600 psi.

## 2.6 SIGNS

- A. Laminated Acrylic or Melamine Plastic Signs:
  1. Engraved legend.
  2. Thickness:
    - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
    - b. For signs larger than 20 sq. in., 1/8 inch thick.
    - c. Engraved legend with white letters on a dark gray background.
    - d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
    - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## 2.7 CABLE TIES

- A. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
  1. Minimum Width: 3/16 inch.
  2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
  3. UL 94 Flame Rating: 94V-0.
  4. Temperature Range: Minus 50 to plus 284 deg F.
  5. Color: Black.

## 2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. 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

### 3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

### 3.2 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. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- K. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. "ELECTRIC."
  - 2. "FIBER"
  - 3. "ELECTRIC - HIGH VOLTAGE"
- L. Self-Adhesive Labels:
  - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  - 2. 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.
- M. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- N. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- O. Underground Line Warning Tape:
  - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway 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.
  - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.

- P. Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using plenum-rated cable ties.
- Q. Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a 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 inches high.
- R. Cable Ties: General purpose, for attaching tags, except as listed below:
  - 1. Outdoors: UV-stabilized nylon.

### 3.3 IDENTIFICATION SCHEDULE

- A. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- B. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive [raceway labels] [vinyl tape applied in bands].
  - 1. Locate identification 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.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use snap-around color-coding bands or self-adhesive vinyl tape to identify the phase.
  - 1. Locate identification 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.
- D. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.
- E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.
- G. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- H. Arc Flash Warning Labeling: Self-adhesive labels.
- I. Operating Instruction Signs: r Laminated acrylic or melamine plastic signs.
- J. Equipment Identification Labels:
  - 1. Outdoor Equipment: Laminated acrylic or melamine sign.
  - 2. Equipment to Be Labeled:
    - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.

- b. Enclosures and electrical cabinets.
  - c. Access doors and panels for concealed electrical items.
  - d. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
  - e. Enclosed switches.
  - f. Enclosed controllers.
  - g. Power-transfer equipment.
  - h. Monitoring and control equipment.
3. Include the following information on equipment labels:
- a. Equipment Identification per the Drawings
  - b. Source of power: (e.g., "Fed From PP-1A")
  - c. What is fed (e.g., "Feeds EF-3")

END OF SECTION

SECTION 260573 - S - POWER SYSTEM STUDIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices, overcurrent protective device settings for selective tripping, and the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.2 ACTION SUBMITTALS

- A. Submit study reports indicated in this section prior to receiving final approval of the distribution equipment submittals, including but not limited to panelboards, transformers, switchboards, switchgear, substations, transfer switches, generators, motor controllers, and disconnect switches. If formal completion of studies will cause delay in equipment manufacturing, provide preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.
- B. Submit the following in digital form:
  - 1. Power system study input data, including completed computer program input data sheets.
  - 2. Power system study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
    - a. Revised single-line diagram, reflecting field investigation results and results of power system studies.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Power System Study Specialist.
- B. Product Certificates: For power system study software, certifying compliance with IEEE 399.

1.4 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 unacceptable.
- B. Short-Circuit Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
  - 1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Power System Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

## PART 2 - PRODUCTS

### 2.1 COMPUTER SOFTWARE

- A. Software Developers: Subject to compliance with requirements, perform studies utilizing software by one of the following:
  - 1. SKM Systems Analysis, Inc.
  - 2. ETAP.
- B. Comply with IEEE 399 and IEEE 551.
- C. Analytical features of fault-current-study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.

### 2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

- 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. Comments and recommendations for system improvements, where needed.
- E. Protective Device Evaluation:
  - 1. Evaluate equipment and protective devices and compare to short-circuit ratings.
  - 2. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
  - 3. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
- F. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.
- G. Short-Circuit Study Output:
  - 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.
  - d. No AC Decrement (NACD) ratio.
  - e. Equivalent impedance.
  - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
  - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

### 2.3 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

- 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. Study Input Data: As described in "Power System Data" Article.
- 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. Phase and 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.
- F. 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:
  1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
  2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
  3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
  4. Plot the following listed characteristic curves, as applicable:
    - a. Power utility's overcurrent protective device.

- b. Low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
- c. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
- d. Transformer full-load current, magnetizing inrush current.
- e. Ground-fault protective devices.
- f. The largest feeder circuit breaker in each motor-control center and panelboard.
5. Provide adequate time margins between device characteristics such that selective operation is achieved.
6. Comments and recommendations for system improvements.

## 2.4 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope.
- 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. Study Input Data: As described in "Power System Data" Article.
- E. Arc-Flash Study Output:
  1. 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.
    - d. No AC Decrement (NACD) ratio.
    - e. Equivalent impedance.
    - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
    - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.
- F. Incident Energy and Flash Protection Boundary Calculations:
  1. Arcing fault magnitude.
  2. Protective device clearing time.
  3. Duration of arc.
  4. Arc-flash boundary.
  5. Working distance.
  6. Incident energy.
  7. Hazard risk category.
  8. Recommendations for arc-flash energy reduction.
  9. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

## PART 3 - EXECUTION

### 3.1 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 Engineer.
  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.
- B. Electrical Survey Data: Gather and tabulate the following input data to support the power system study:
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.
  2. Obtain electrical power utility impedance at the service.
  3. Power sources and ties.
  4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
  5. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
  6. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
  7. Motor horsepower and NEMA MG 1 code letter designation.
  8. Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

### 3.2 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. The extent of the electrical power system to be studied is indicated on Drawings.
- D. 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 where fault current is 10 kA or less, or as required to satisfy coordination study and arc-flash study requirements.
- E. 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.
- F. The calculations shall include the ac fault-current decay from induction motors. 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.
- G. 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. Low-voltage switchgear.
  4. Control panels.
  5. Power distribution panelboards.
  6. Branch circuit panelboards.
  7. Disconnect switches.

- H. Equipment short-circuit ratings and protective device interrupting ratings shall be selected based on the results of the fault current study.

### 3.3 PROTECTIVE DEVICE COORDINATION STUDY

- A. Perform study following the general study procedures contained in IEEE 399.
- B. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- C. Evaluate overcurrent protective devices serving transformers and verify that the devices will not open upon energization of the transformer. Where device rating and/or type must be changed to avoid opening upon energization, notify the Contractor and Engineer and record recommended device changes in the report.
- D. Evaluate overcurrent protective device coordination against project selective coordination criteria. Where the system devices and/or configuration cannot achieve the required selective coordination criteria, evaluate alternate overcurrent device selections that will meet the criteria and record recommendations in the report.

### 3.4 ARC-FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- B. 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.
- C. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.
- D. 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.
- E. 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 shall be decremented as follows:
  - 1. Fault contribution from induction motors should not be considered beyond three to five cycles.
- F. 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.
- G. 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.
- H. Labels: Print and install labels for each modeled piece of electrical equipment. Provide green bordered labels for PPE category 0 & 1, yellow bordered labels for PPE category 2 & 3, and red bordered labels for PPE category 4 & dangerous. Labels shall have flash protection and shock protection and shall include:
  - 1. Flash Hazard in inches
  - 2. Arc Flash rating in cal/sq. cm

3. Flash protection boundary in inches
4. Glove class
5. PPE clothing category
6. Shock hazard in volts
7. Limited Approach distance in inches
8. Restricted Approach distance in inches
9. Prohibited Approach distance in inches
10. Bus Designation
11. Upstream overcurrent protection designation
  - a. Where applicable: Indication if values are based on “maintenance mode” on or off. Where temporary settings are utilized in the upstream overcurrent protection device for arc energy reduction purposes, provide two separate labels for each condition.
12. Oversize print of Warning or Danger

### 3.5 ADJUSTING

- A. Make minor modifications to equipment as required to accomplish compliance with short-circuit study.
- B. Set field-adjustable overcurrent protective devices to the recommended settings based on results from the power systems studies.

### 3.6 DEMONSTRATION

- A. Train Owner's operating and maintenance personnel in the use of study results.

END OF SECTION

SECTION 260800 - S - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes Cx process requirements for the following electrical components, systems, assemblies, and equipment:
  - 1. Electrical equipment connected to Normal power systems, including the following:
    - a. Transformers.
    - b. Primary and secondary service electrical systems.
    - c. Distribution and branch-circuit panelboards.
    - d. Grounding systems.
  - 2. Controls and instrumentation, including the following:
    - a. Lighting control systems.

1.2 DEFINITIONS

- A. Low Voltage: 600 V and below.
- B. Medium Voltage: 601 V and above.
- C. Normal Power Systems: A power system that provides primary power to a facility.
- D. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.3 INFORMATIONAL SUBMITTALS

- A. Construction Checklists: Draft construction checklists will be created by CxA for Contractor review.
- B. Construction Checklists: Include the following for construction checklists:
  - 1. Instrumentation and control for lighting control systems.
  - 2. Low-voltage power cables.
  - 3. Electrical feeders and branch circuits.
  - 4. Liquid-filled transformers.
  - 5. Dry-type transformers.
  - 6. Low-voltage surge protective devices.
  - 7. Medium-voltage power cables.
  - 8. Metering devices.
  - 9. Grounding systems.
  - 10. Ground-fault protection systems.
  - 11. Panelboards.
  - 12. Receptacles and devices.
  - 13. Site Lighting.- Parking, Pedestrian, Field, In Grade
  - 14. Vehicle charging equipment.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For electrical systems and components to include in operation and maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Electrical Testing Technician Qualifications: Technicians to perform electrical Construction Checklist verification tests, Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate's degree in electrical systems, or similar field. Degree may be offset by three years' experience as an apprentice or a journey-level electrician. Generally, required knowledge includes electrical and HVAC&R concepts, building operations, and application and use of tools and instrumentation to measure performance of electrical equipment, assemblies, and systems.
  2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.
- B. Testing Equipment and Instrumentation Quality and Calibration: For test equipment and instrumentation required to perform electrical Cx work, perform the following:
1. Test equipment and instrumentation shall meet the following criteria:
    - a. Capable of testing and measuring performance within the specified acceptance criteria.
    - b. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
    - c. Be maintained in good repair and operating condition throughout duration of use on Project.
    - d. Be recalibrated/repared if dropped or damaged in any way since last calibrated.
- C. Proprietary Test Instrumentation and Tools:
1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:
    - a. Submit proprietary instrumentation and tools list. For each instrument or tool, identify the following:
      - 1) Instrument or tool identification number.
      - 2) Equipment schedule designation of equipment for which the instrument or tool is required.
      - 3) Manufacturer, make, model, and serial number.
      - 4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.
    - b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
    - c. Electrical proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 CONSTRUCTION CHECKLISTS

- A. Prepare detailed construction checklists for electrical systems, subsystems, equipment, and components. Complete and submit construction checklists.

### 3.2 CONSTRUCTION CHECKLIST REVIEW

- A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.
- B. Return draft Construction Checklist review comments within 10 days of receipt.
- C. When review comments have been resolved, CxA will provide final construction checklists, marked "Approved for Use, (date)."
- D. Use only construction checklists, marked "Approved for Use, (date)."

### 3.3 GENERAL TESTING REQUIREMENTS

- A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved Shop Drawings and submittals.
- B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.
- C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.
- E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.
- F. Construction Checklists: Prepare and submit detailed construction checklists for electrical systems, subsystems, equipment, and components.
  - 1. Contributors to development of construction checklists shall include, but are not limited to, the following:
    - a. Electrical systems and equipment installers.
    - b. Electrical instrumentation and controls installers.
- G. Perform tests using design conditions, whenever possible.
  - 1. Simulated conditions may, with approval of Engineer, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
  - 2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
  - 3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.
- H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.



- I. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.
- J. Coordinate schedule with, and perform Cx activities at the direction of the CxA.
- K. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Sections specifying electrical systems and equipment.
- L. Provide technicians, instrumentation, tools, and equipment to complete and document the following:
  - 1. Performance tests.
  - 2. Demonstration of a sample of performance tests.
  - 3. Cx tests.
  - 4. Cx test demonstrations.

### 3.4 Cx TESTS FOR ELECTRICAL SYSTEMS

- A. Verification of Normal Power System Operation:
  - 1. Prerequisites: Acceptance of results for construction checklists for Division 26 electrical components associated with Normal power system.
  - 2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
  - 3. Test Purpose: Verify operation of Normal power system.
  - 4. Test Conditions: Energize components of Normal power system, one at a time.
  - 5. Acceptance Criteria: Proper operation of Normal power system over a 24 -hour period.
- B. Test Purpose: Verify operation of control and monitoring systems for Normal and Essential power systems.
- C. Test Conditions:
  - 1. Energize components of Normal power system.
  - 2. Test operation of equipment.
- D. Acceptance Criteria: Operation of equipment according to OPR.

END OF SECTION

SECTION 262213 - S - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution, dry-type transformers with a nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
  - 2. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.
- B. Shop Drawings:
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
  - 3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: On receipt, inspect for and note any shipping damage to packaging and transformer.
  - 1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.
- B. Storage: Store in a warm, dry, and temperature-stable location in original shipping packaging.
- C. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.
- D. Handling: Follow manufacturer's instructions for lifting and transporting transformers.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. ABB.
  - 3. Siemens Power Transmission & Distribution, Inc.
  - 4. Square D; by Schneider Electric.
- B. Source Limitations: Obtain each transformer type from single source from single manufacturer.

### 2.2 GENERAL TRANSFORMER REQUIREMENTS

- A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B. Comply with NFPA 70.
  - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Transformers Rated 15 kVA and Larger:
  - 1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
  - 2. Marked as compliant with DOE 2016 efficiency levels by an NRTL.
- D. Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

### 2.3 DISTRIBUTION TRANSFORMERS

- A. Comply with NFPA 70, and list and label as complying with UL 1561.
- B. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.
  - 1. One leg per phase.
  - 2. Core volume shall allow efficient transformer operation at 10 percent above the nominal tap voltage.
  - 3. Grounded to enclosure.
- C. Coils: Continuous windings without splices except for taps.
  - 1. Coil Material: Copper.
  - 2. Internal Coil Connections: Brazed or pressure type.
  - 3. Terminal Connections: Welded.
- D. Encapsulation: Transformers smaller than 30 kVA shall have core and coils completely resin encapsulated.
- E. Enclosure: Ventilated.
  - 1. NEMA 250, Type 3R: Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
  - 2. Wiring Compartment: Sized for conduit entry and wiring installation.
  - 3. Finish: Comply with NEMA 250.
    - a. Finish Color: Ansi Bell Green weather-resistant enamel.

- b. Finish Color: ANSI finish of grey or green is required and shall be similar finish of utility transformer.
- F. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- G. Insulation Class, Smaller Than 30 kVA: 180 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.
- H. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 150 deg C rise above 40 deg C ambient temperature.
- I. Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.
- J. Low-Sound-Level Requirements: Maximum sound levels when factory tested according to IEEE C57.12.91, as follows:
  - 1. 9.00 kVA and Less: 40 dBA.
  - 2. 9.01 to 30.00 kVA: 45 dBA.
  - 3. 30.01 to 50.00 kVA: 45 dBA for K-factors of 1, 4, and 9 .
  - 4. 50.01 to 150.00 kVA: 50 dBA for K-factors of 1, 4, and 9 .
  - 5. 150.01 to 300.00 kVA: 55 dBA for K-factors of 1, 4, and 9 .
  - 6. 300.01 to 500.00 kVA: 60 dBA for K-factors of 1, 4, and 9 .
  - 7. 500.01 to 700.00: 62 dBA for K-factors of 1, 4, and 9 .
  - 8. 700.01 to 1000.00: 64 dBA for K-factors of 1, 4, and 9 .

#### 2.4 IDENTIFICATION

- A. Nameplates: Engraved, laminated-acrylic or melamine plastic signs for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

#### 2.5 SOURCE QUALITY CONTROL

- A. Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.

- F. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.
  - 1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.
  - 2. Brace wall-mounted transformers as specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- B. Install transformers level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.
- C. Construct concrete bases according to Division 03 and anchor floor-mounted transformers according to manufacturer's written instructions and requirements in Section 260529 "Hangers and Supports for Electrical Systems."
  - 1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- D. Secure transformer to concrete base according to manufacturer's written instructions.
- E. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.
- F. Remove shipping bolts, blocking, and wedges.

### 3.3 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. 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-486B.
- D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections[ **with the assistance of a factory-authorized service representative**].
- B. Small (Up to 167-kVA Single-Phase or 500-kVA Three-Phase) Dry-Type Transformer Field Tests:
  - 1. Visual and Mechanical Inspection.
    - a. Inspect physical and mechanical condition.
    - b. Inspect anchorage, alignment, and grounding.
    - c. Verify that resilient mounts are free and that any shipping brackets have been removed.
    - d. Verify the unit is clean.
    - e. Perform specific inspections and mechanical tests recommended by manufacturer.
    - f. Verify that as-left tap connections are as specified.
    - g. Verify the presence of surge arresters and that their ratings are as specified.
  - 2. Electrical Tests:

- a. Measure resistance at each winding, tap, and bolted connection.
  - b. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
- C. Remove and replace units that do not pass tests or inspections and retest as specified above.
- D. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

### 3.5 ADJUSTING

- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
- B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

### 3.6 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION

## PART 1 - GENERAL

### 1.1 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
  - 1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
  - 2. 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.
  - 2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
  - 3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
  - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
  - 5. Include evidence of NRTL listing for SPD as installed in panelboard.
  - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

### 1.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in 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.

### 1.4 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. Keys: Two spares for each type of panelboard cabinet lock.

### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; storage in a dry space with adequate heating to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.7 FIELD 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 to plus 104 deg F.
  - b. Altitude: Not exceeding 6600 feet.

PART 2 - PRODUCTS

2.1 PANELBOARDS GENERAL REQUIREMENTS

- A. 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.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA PB 1.
- D. Comply with NFPA 70.
- E. Enclosures: Flush and Surface-mounted, as indicated, dead-front cabinets.
  1. Rated for environmental conditions at installed location.
    - a. Outdoor Locations: NEMA 250, Type 3R or Type 4X.
  2. Height: 84 inches maximum.
  3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall 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. Finishes:
    - a. Panels and Trim: 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: Galvanized steel.
- F. Phase, Neutral, and Ground Buses:
  1. Material: Tin-plated aluminum for 400 Amp and below; Hard-drawn copper, 98 percent conductivity for 600 Amp and above.
    - a. Plating shall run entire length of bus.
    - b. Bus shall be fully rated the entire length.
  2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
  3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
  4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.



- G. Conductor Connectors: Suitable for use with conductor material and sizes.
  - 1. Material: Same as buses.
  - 2. Terminations shall allow use of 75 deg C rated conductors without derating.
  - 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
  - 4. Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
- H. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
- I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
  - 1. Panelboards and overcurrent protective devices rated 240 V or less shall have minimum short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical where supplied from transformers rated less than 75kVA and not less than 22,000 A rms symmetrical where supplied from transformers rated 112.5kVA or greater. Short-Circuit current rating shall be greater than the maximum available fault current as determined in the power system study specified in Section 260573 "Power System Studies".
  - 2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have minimum short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical. Short-Circuit current rating shall be greater than the maximum available fault current as determined in the power system study specified in Section 260573 "Power System Studies".

## 2.2 PERFORMANCE REQUIREMENTS

- A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD. Provide Type 1 for service entrance equipment; Type 2 for other panelboards as indicated or specified..

## 2.3 POWER PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. ABB.
  - 3. SIEMENS Industry, Inc.; Energy Management Division.
  - 4. Square D; by Schneider Electric.
- B. Panelboards: NEMA PB 1, distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
  - 1. For doors more than 36 inches high, provide two latches, keyed alike.
- D. Mains: As indicated.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker: Bolt-on circuit breakers where individual positive-locking device requires mechanical release for removal or fused switches as indicated.

## 2.4 ELECTRONIC-GRADE PANELBOARDS

- A. SPD.

1. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
2. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V and 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:
  - a. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  - b. Line to Ground: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  - c. Neutral to Ground: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  - d. Line to Line: 2000 V for 480Y/277 V, 1200 V for 208Y/120 V.
3. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:
  - a. Line to Neutral: 700 V.
  - b. Line to Ground: 700 V.
  - c. Neutral to Ground: 700 V.
  - d. Line to Line: 1200 V.
4. SCCR: Equal to the SCCR of the panelboard in which installed.
5. Inominal Rating: 20 kA.

B. Buses:

1. Copper phase and neutral buses
2. Copper equipment ground buses.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following and must be provided by panelboard manufacturer.

1. Eaton.
2. ABB.
3. SIEMENS Industry, Inc.; Energy Management Division.
4. Square D; by Schneider Electric.

B. MCCB: Comply with UL 489, with 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. Electronic Trip Circuit Breakers:
  - a. RMS sensing.
  - b. Field-replaceable rating plug or electronic trip.
  - c. Digital display of settings, trip targets, and indicated metering displays.
  - d. Multi-button keypad to access programmable functions and monitored data.
  - e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
  - f. Integral test jack for connection to portable test set or laptop computer.
  - g. Field-Adjustable Settings:
    - 1) For all circuit breakers with frame sizes equal to or greater than 400A :
      - a) Long-time pickup level.
      - b) Long-time time adjustment.
    - 2) For all circuit breakers with frame sizes equal to or greater than 400A:
      - a) Short-time pickup levels.
      - b) Short-time time adjustment.
    - 3) Where required by NEC for circuit breakers with frame sizes rated 1000A and greater on 480V and 480Y/277V circuits:
      - a) Ground-fault pickup level, time delay, and  $I^2 T$  response.

3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. Subfeed Circuit Breakers: Vertically mounted.
5. MCCB Features and Accessories:
  - a. Standard frame sizes, trip ratings, and number of poles.
  - b. Breaker handle indicates tripped status.
  - c. UL listed for reverse connection without restrictive line or load ratings.
  - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
  - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
  - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
  - g. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.

## 2.6 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
  1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

## PART 3 - EXECUTION

### 3.1 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 NFPA 70.
- B. Receive, inspect, handle, and store panelboards according to NECA 407.
- C. Examine panelboards before installation. Reject panelboards that are damaged, 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.

### 3.2 INSTALLATION

- 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.
- B. Comply with NECA 1.
- C. Install panelboards and accessories according to NECA 407.

- D. Equipment Mounting:
  - 1. Install power panelboards and load centers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases in Division 3.
  - 2. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- E. Mount panelboard cabinet plumb and rigid without distortion of box.
- F. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- G. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.
- H. Install overcurrent protective devices and controllers not already factory installed.
  - 1. Set field-adjustable, circuit-breaker trip ranges.
  - 2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- I. 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.
- J. Install filler plates in unused spaces.
- K. Install handle clamps on all branch circuit overcurrent devices serving fire alarm equipment.

### 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

### 3.4 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 for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Do not perform optional tests. 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. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.5 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 per Coordination Study.

### 3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - B. Comply with NFPA 70.
  - C. RoHS compliant.
  - D. Comply with NEMA WD 1 and NEMA WD 6.
  - E. Devices indicated as "tamper-resistant" shall have integral shutters that operate only when both prongs of a plug are inserted in the receptacle.
  - F. Devices indicated as "weather-proof" or "weather-resistant" shall have the following:
    - 1. Spring-loaded, gasketed, "weather-proof-in-use" cover.
    - 2. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.
  - G. Switches indicated as Key-switch shall have factory-supplied key in lieu of switch handle.
  - H. Devices indicated or specified as anti-microbial shall have contact surfaces treated with a factory-applied coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  - I. Devices indicated or specified as decorator style shall have a rectangular face opening.
  - J. Devices for Owner-Furnished Equipment:
    - 1. Receptacles: Match plug configurations.
    - 2. Cord and Plug Sets: Match equipment requirements.
  - K. Device Color:
    - 1. Wiring Devices Connected to Normal Power System: As selected by Engineer unless otherwise indicated or required by NFPA 70 or device listing.
    - 2. Device to match adjacent surface (grey for silver/grey poles, black for black poles/posts, brown for brown posts)
    - 3. SPD Devices: Blue.
  - L. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.
- 2.2 STANDARD RECEPTACLES, 125 V, 20 A
- A. Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Two pole, three wire, and self-grounding.
3. Configuration: Heavy-duty, NEMA 5-20R
4. Standards: Comply with UL 498 and FS W-C-596.

#### 2.3 GFCI RECEPTACLES, 125 V, 20 A

##### A. Duplex GFCI Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Non-feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

#### 2.4 DIMMERS

##### A. Wall-Box Dimmers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Leviton Manufacturing Co., Inc.
  - b. Lutron Electronics Co., Inc.
  - c. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
3. Control: Continuously adjustable slider; with single-pole or three-way switching.
4. Standards: Comply with UL 1472.
5. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

#### 2.5 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
  1. Plate-Securing Screws: Metal with head color to match plate finish.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover. See drawings for product specifications.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

- B. Coordination with Other Trades:
1. Protect installed devices and their boxes. 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 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 right 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 comply with NFPA 70, Article 300, 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. Pigtailling existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
1. Replace devices that have been in temporary use during construction and that 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 in length.
  5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
  6. Use a torque screwdriver when a torque is recommended or required by 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. Receptacle Type:
1. Install GFCI receptacles for all 20A, 125V receptacles supplied by single-phase branch circuits rated 150V or less to ground in the following spaces/locations:
    - a. Outdoors.
- F. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- G. 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.
- H. 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.



- I. 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.

### 3.2 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each wiring device with panelboard identification and circuit number. In spaces where low voltage lighting control wall stations are utilized, identify panelboard and circuit number of the lights controlled by the low voltage device. In spaces with multiple lighting circuits, provide multiple labels to indicate each lighting branch circuit serving the space. Use hot, stamped, or engraved machine printing with black-filled lettering on front face of plate, and durable wire markers or tags inside outlet boxes.

### 3.3 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Tests for 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 unacceptable.
  - 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. 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.
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

SECTION 262743 - S - ELECTRIC-VEHICLE SERVICE EQUIPMENT - AC LEVEL 1 AND LEVEL 2

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes EVSE that provides AC Level 2 EV charging.

1.2 DEFINITIONS

- A. EV: Electric vehicle.
- B. EV Cable: The off-board cable containing the conductor(s) to connect the EV power controller to the EV that provides both power and communications during energy transfer.
- C. EV Charger or EV Charging Equipment: See "EVSE."
- D. EV Connector: A conductive device that, when electrically coupled to an EV inlet, establishes an electrical connection to the EV for the purpose of power transfer and information exchange. This device is part of the EV coupler.
- E. EV Coupler: A mating EV inlet and connector set.
- F. EV Inlet: The device in the vehicle into which the EV connector is inserted, and a conductive connection is made for the transfer of power and communication. This device is part of the EV coupler.
- G. EVSE: Electric-Vehicle Supply Equipment. It includes the EV charging equipment and conductors, including the ungrounded, grounded, and equipment grounding conductors and EV cables, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for transferring energy between the premise wiring and the EV.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for EV charging equipment.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Sustainable Design Submittals:
  - 1. LEED v4: Plan showing location and number of EV charging units, charging levels and connectors, and ability of EV charging units to participate in a demand-response or time-of-use pricing program.
- C. Shop Drawings: For EVSE.
  - 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 mounting assemblies for EV charging equipment.
  - 4. Include diagrams for power, signal, and control wiring.

5. Include verification of wired or wireless communications service at each location of EVSE.

D. Product Schedule: For EVSE.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For EVSE to include in operation and maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating manuals.
2. Program Software Backup: On USB, CD, Cloud, or approved media, complete with configuration files.
3. Device address and password list.
4. Printout of software application and graphic screens.

#### 1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

#### 1.8 FIELD CONDITIONS

A. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.

B. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not exceeding minus 22 to plus 122 deg F.
2. Altitude: Not exceeding 6600 feet.

#### 1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of EVSE that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: Five year(s) from date of Substantial Completion.
2. Provide 5 year Assure Warranty and 5 year Commercial Cloud Plan
3. Warranties to be transferable to the city at the time of activation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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. ChargePoint.

#### 2.2 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: 5 to 104 deg F.

B. Relative Humidity: Zero to 95 percent.

- C. Altitude: Sea level to 1000 feet.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
- E. Surge Withstand: 6 kV at 3000 A.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- G. EV Charging Levels:
  - 1. Dual vehicles, AC Level 2 at up to 19.2 kW per vehicle.

### 2.3 EVSE DESCRIPTION

- A. Comply with NFPA 70.
- B. Comply with:
  - 1. UL 2231-1.
  - 2. UL 2594.
  - 3. SAE J1772 for SAE combo chargers.
- C. Comply with ADA-ABA Accessibility Guidelines.
- D. Control Power: 20 A, 110/120-V ac, 60 Hz, single phase per charger.
- E. Input Power:
  - 1. , As specified on drawings, 60 Hz, single-phase services per charger.
- F. Integral GFCI.
- G. EVSE Mounting: Pedestal mount As indicated on Drawings.
- H. Enclosures:
  - 1. Rated for environmental conditions at installed location.
    - a. Outdoor Locations: NEMA 250, Type 3R.
- I. EV Cable and Connectors:
  - 1. SAE J1772 connector.
  - 2. Double connectors with locking holster.
  - 3. 18-foot minimum cable with cable management system.
  - 4. Field-replaceable connector and cable assembly.
- J. Status Indicators:
  - 1. LEDs to indicate power, charging, charging complete, system status, faults, and service.
- K. Display Screen:
  - 1. Daylight viewable, UV-protected display with human-machine interface capability.
  - 2. Displays power, charging, charging complete, remote control, system status, faults, and service.
- L. Networking:
  - 1. Capable of remote configuration and reporting.
- M. Payment System:
  - 1. Contactless credit card reader.

- N. Charging Network: Compatible with the Chargepoint EV charging network.
  - 1. Multiple units shall independently connect to charging network.

#### 2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by utilizing cushioning materials or foam or 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

#### 3.1 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 roughing-in for EVSE electrical conduit to verify actual locations of conduit connections before equipment installation.
- C. Examine pavement for suitable conditions where EVSE will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 413.
- B. Concrete Base Mounting:
  - 1. Install EVSE on 6-inch nominal-thickness concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
    - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
    - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
    - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
    - e. Secure EVSE to concrete base according to manufacturer's written instructions.
  - 2. Install EVSE on 12-inch nominal-diameter and 48-inch- deep concrete base. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
    - a. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
    - c. Secure EVSE to concrete base according to manufacturer's written instructions.
- C. Wiring Method: Install cables in raceways and cable trays. Conceal raceway and cables except in unfinished spaces.
  - 1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

2. Comply with requirements for underground raceways and enclosures specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems."
    - D. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
    - E. 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.
    - F. Disconnect: Install disconnect in a readily accessible location according to Section 262816 "Enclosed Switches and Circuit Breakers."
    - G. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking from enclosures and components.
    - H. Secure covers to enclosure.
    - I. Cybersecurity:
      1. Software:
        - a. Coordinate security requirements with IT department and Public Works Director .
        - b. Ensure that latest stable software release is installed and properly operating.
        - c. Disable or change default passwords to password of at least eight characters in length, using a combination of uppercase and lower letters, numbers, and symbols. Record passwords and turn over to party responsible for system operation and administration.
      2. Hardware:
        - a. Coordinate location and access requirements with IT department and Public Works Director.
        - b. Enable highest level of wireless encryption that is compatible with Owner's ICT network.
        - c. Disable dual network connections.
- 3.3 CONNECTIONS
- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
  - B. Comply with grounding requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
  - C. Comply with requirements for installation of conduit in Section 260533 "Raceways and Boxes for Electrical Systems." Drawings indicate general arrangement of conduit, fittings, and specialties.
  - D. 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-486B.
  - E. Verify that all electrical connections have been made according to the manufacturer's instructions. Remove all burrs, shavings, and detritus from inside the enclosure.
  - F. After confirming all connections, install covers and tighten fasteners to according to manufacturer's instructions.
- 3.4 IDENTIFICATION
- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections:
  - 1. For each unit of EVSE, perform the following tests and inspections:
    - a. Unit self-test.
    - b. Operation test with load bank.
    - c. Operation test with EV.
    - d. Network communications test.
- C. EVSE will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for five years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within five years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
  - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain EV charging equipment.

END OF SECTION

SECTION 262816 - S - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
- B. Shop Drawings: For enclosed switches and circuit breakers.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Include wiring diagrams for power, signal, and control wiring.

1.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
- C. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.



2. ABB.
3. Siemens Industry, Inc.
4. Square D; by Schneider Electric.

B. Type HD, Heavy Duty:

1. Double throw.
2. Three pole, unless otherwise indicated. Switch to match circuit shown on drawing
3. 240 or 600-V ac.
4. Ampacity as indicated or scheduled.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified or indicated fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. 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. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Arc-Energy Reduction Relay: For switches rated 1200A, provide internally mounted device compliant with NFPA 70 article 240.67 requirements, with external display containing pushbutton and visual indicator for maintenance mode.
5. Lugs: Mechanical type, suitable for number, size, and conductor material.

### 2.3 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (NEMA 250 Types 3R, 12) or a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel).
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 .
- D. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

## PART 3 - EXECUTION

### 3.1 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  1. Outdoor Locations: NEMA 250, Type 3R or 4X.

### 3.2 INSTALLATION

- 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.

- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NFPA 70 and NECA 1.
- F. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Power System Studies."

### 3.3 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections.
- D. Tests and Inspections for Switches:
  - 1. Visual and Mechanical Inspection:
    - a. Inspect physical and mechanical condition.
    - b. Inspect anchorage, alignment, grounding, and clearances.
    - c. Verify that the unit is clean.
    - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
    - e. Verify that fuse sizes and types match the Specifications and Drawings.
    - f. Verify that each fuse has adequate mechanical support and contact integrity.
    - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
      - 1) Use a low-resistance ohmmeter.
        - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
      - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
        - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
    - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
    - i. Verify correct phase barrier installation.
    - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
  - 2. Electrical Tests:

- a. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
  - c. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
  - d. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."
- E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.
1. Test procedures used.
  2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
  3. List deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION

SECTION 263600 - S - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Coordination of Submittals: Include preliminary power system studies with submittal or submit to Engineer prior to submittal. Refer to Section 260573 "Power System Studies" for additional requirements. Transfer switches submitted prior to preliminary power system studies will be returned without review.
- B. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.
- C. Shop Drawings:
  - 1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
  - 2. Include material lists for each switch specified.
  - 3. Single-Line Diagram: Show connections between transfer switch, [bypass/isolation switch, ]power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
  - 4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.2 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
  - 1. Include the following:
    - a. Features and operating sequences, both automatic and manual.
    - b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
  - 1. Member company of NETA.
    - a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NEMA ICS 1.
- C. Comply with NFPA 99.
- D. Comply with UL 1008 unless requirements of these Specifications are stricter.
- E. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- F. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
  - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
  - 2. Short-time withstand capability for 18 cycles.
- G. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- H. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- I. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.
- J. Service-Rated Transfer Switch:
  - 1. Comply with UL 869A and UL 489.
  - 2. Provide terminals for bonding the grounding electrode conductor to the grounded service conductor.
  - 3. In systems with a neutral, the bonding connection shall be on the neutral bus.
  - 4. Provide removable link for temporary separation of the service and load grounded conductors.
  - 5. Surge Protective Device: Service rated.
- K. Neutral Terminal: Solid and fully rated unless otherwise indicated.
- L. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- M. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- N. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable with printed markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."
  - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
  - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
  - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
  - 4. Accessible via front access.

- O. Enclosures: General-purpose NEMA 250, Type 4X, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

## 2.2 NONAUTOMATIC TRANSFER SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. TryStar (B.O.D.)
  - 2. ASCO Power Technologies.
  - 3. ESL Power Systems, Inc.
  - 4. Russelectric, Inc.
- B. Manual and Electrically Operated: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Manual handle provides quick-make, quick-break manual-switching action. Switch shall be capable of electrically or manually transferring load in either direction with either or both sources energized. Control circuit disconnects from electrical operator during manual operation.
- C. Double-Throw Switching Arrangement: Incapable of pauses or intermediate position stops during switching sequence.
- D. Pilot Lights: Indicate source to which load is connected.
- E. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and alternative-source sensing circuits.
  - 1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
  - 2. Emergency Power Supervision: Red light with nameplate engraved "Alternative Source Available."
- F. Unassigned Auxiliary Contacts: Switch shall have one set of normally closed contacts for each switch position, rated 10 A at 240-V ac.
- G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
  - 1. Switch Action: Double throw; mechanically held in both directions.
  - 2. Contacts: Silver composition or silver alloy for load-current switching.
  - 3. Conductor Connectors: Suitable for use with conductor material and sizes.
  - 4. Material: Tin-plated aluminum Hard-drawn copper, 98 percent conductivity.
  - 5. Main and Neutral Lugs: Compression Mechanical type.
  - 6. Ground Lugs and Bus-Configured Terminators: Compression Mechanical type.
  - 7. Connectors shall be marked for conductor size and type according to UL 1008.

## 2.3 TRANSFER SWITCH ACCESSORIES

- A. Bypass/Isolation Switches:
  - 1. Source Limitations: Same manufacturer as transfer switch in which installed.
  - 2. Comply with requirements for Level 1 equipment according to NFPA 110.
  - 3. Description: Manual type, arranged to select and connect either source of power directly to load, isolating transfer switch from load and from both power sources. Include the following features for each combined automatic transfer switch and bypass/isolation switch:
    - a. Means to lock bypass/isolation switch in the position that isolates transfer switch with an arrangement that permits complete electrical testing of transfer switch while isolated. Interlocks shall prevent transfer-switch operation, except for testing or maintenance, while automatic transfer switch is isolated.
    - b. Provide means to make power available to transfer-switch control circuit for testing and maintenance purposes.

- c. Drawout Arrangement for Transfer Switch: Provide physical separation from live parts and accessibility for testing and maintenance operations. Transfer switch and bypass/isolation switch shall be in isolated compartments.
  - d. Transition: Provide closed-transition operation when transferring from main transfer switch to bypass/isolation switch on the same power source.
  - e. Bypass/Isolation Switch Current, Voltage, Closing, and Short-Circuit Withstand Ratings: Equal to or greater than those of associated automatic transfer switch, and with same phase arrangement and number of poles.
  - f. Contact temperatures of bypass/isolation switches shall not exceed those of automatic transfer-switch contacts when they are carrying rated load.
  - g. Manual Control: Constructed so load bypass and transfer-switch isolation can be performed by one person in no more than two operations in 15 seconds or less. Operating handles shall be externally operated.
  - h. Legend: Manufacturer's standard legend for control labels and instruction signs shall describe operating instructions.
  - i. Maintainability: Fabricate to allow convenient removal of major components from front without removing other parts or main power conductors.
4. Interconnection of Bypass/Isolation Switches with Automatic Transfer Switches: Factory-installed copper bus bars; plated at connection points and braced for the indicated available short-circuit current.
- B. Remote Controller Assembly:
1. Source Limitations: Same manufacturer as transfer switch in which installed.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Floor-Mounting Switch: Anchor to concrete bases by bolting and mount directly adjacent and against trash enclosure
1. Install transfer switches on cast-in-place concrete equipment base(s).
  2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
  3. Provide workspace and clearances required by NFPA 70.
- B. Annunciator and Control Panel Mounting: Surface mounted on unistrut structure that supports transfer switch.
- C. Identify components according to Section 260553 "Identification for Electrical Systems."

#### 3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, motor controls, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.
1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. .
- F. Route and brace conductors according to manufacturer's written instructions Do not obscure manufacturer's markings and labels.
- G. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches in length.

### 3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. After installing equipment, test for compliance with requirements according to NETA ATS.
  - 2. Visual and Mechanical Inspection:
    - a. Compare equipment nameplate data with Drawings and Specifications.
    - b. Inspect physical and mechanical condition.
    - c. Inspect anchorage, alignment, grounding, and required clearances.
    - d. Verify that the unit is clean.
    - e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
    - f. Verify that manual transfer warnings are attached and visible.
    - g. Verify tightness of all control connections.
    - h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
      - 1) Use of low-resistance ohmmeter.
      - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
    - i. Perform manual transfer operation.
    - j. Verify positive mechanical interlocking between normal and alternate sources.
    - k. Perform visual and mechanical inspection of surge arresters.
    - l. Inspect control power transformers.
      - 1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
      - 2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
      - 3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
  - 3. Electrical Tests:
    - a. Perform insulation-resistance tests on all control wiring with respect to ground.
    - b. Verify settings and operation of control devices.
    - c. Calibrate and set all relays and timers.
    - d. Verify phase rotation, phasing, and synchronized operation.
    - e. Verify correct operation and timing of the following functions:
      - 1) Normal source voltage-sensing and frequency-sensing relays.
      - 2) Engine start sequence.
      - 3) Time delay on transfer.
      - 4) Alternative source voltage-sensing and frequency-sensing relays.
      - 5) Interlocks and limit switch function.
      - 6) Time delay and retransfer on normal power restoration.
  - 4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
    - a. Check for electrical continuity of circuits and for short circuits.



- b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
    - c. Verify that manual transfer warnings are properly placed.
    - d. Perform manual transfer operation.
  5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.
    - B. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
    - C. Transfer switches will be considered defective if they do not pass tests and inspections.
    - D. Remove and replace malfunctioning units and retest as specified above.
    - E. Prepare test and inspection reports.
- 3.4 DEMONSTRATION
  - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.
  - B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.
  - C. Coordinate this training with that for sewage lift equipment.

END OF SECTION

SECTION 265600 - S - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.
- B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.
- C. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.
  - 1. Basic wind speed for calculating wind load for poles exceeding 49.2 feet in height is 100 mph.
    - a. Wind Importance Factor: 1.0.
    - b. Minimum Design Life: 50 years.
    - c. Velocity Conversion Factors: 1.0.
  - 2. Basic wind speed for calculating wind load for poles 50 feet high or less is 100 mph .
    - a. Wind Importance Factor: 1.0.
    - b. Minimum Design Life: 25 years.
    - c. Velocity Conversion Factors: 1.0.

1.2 ACTION SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.
  - 1. Lamps, including life, output (lumens, CCT, and CRI) and energy-efficiency data.
  - 2. Photometric data and adjustment factors based on laboratory tests, complying with IES LM-80
    - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficiency 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.
  - 3. Wiring diagrams for power, control, and signal wiring.
  - 4. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
- B. Shop Drawings:
  - 1. For nonstandard or custom luminaires.
    - a. Include plans, elevations, sections, and mounting and attachment details.
    - b. Include details of luminaire assemblies. Include dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
    - c. Include diagrams for power, signal, and control wiring.
  - 2. Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Provide luminaires from a single manufacturer for each luminaire type.

- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective cover prior to shipping.

1.5 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 Engineer prior to the start of the luminaire installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- G. Exposed Hardware Material: Stainless steel.
- H. Internal driver.
- I. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- J. L70 lamp life of 50,000 hours.

- K. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- L. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- M. 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.
- N. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- O. 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.
- P. 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, "Solvent Cleaning," 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, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
  - 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: As selected by Engineer from manufacturer's standard catalog of colors or as indicated on Drawings.
- Q. 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. 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 the drawings..

## 2.3 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

- A. Structural Characteristics: Comply with AASHTO LTS-4-M.
  - 1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
  - 2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
- B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
  - 1. Materials: 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.
3. Anchor-Bolt Template: Plywood or steel.

- D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws. Provide on all poles..
- E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

## 2.4 STEEL POLES

- A. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in height with access handhole in pole wall.
1. Shape: Per Drawings. Tapered for 20 ft and taller..
  2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- B. Steel Mast Arms: Per Drawings, continuously welded to pole attachment plate. Material and finish same as pole.
- C. Brackets for Luminaires: Detachable, cantilever, without underbrace.
1. Adapter fitting welded to pole, allowing the bracket to be bolted to the pole mounted adapter, then bolted together with stainless or galvanized-steel bolts.
  2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire.
  3. Match pole material and finish.
- D. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- E. Steps: Fixed steel, with nonslip treads, positioned for 15-inch vertical spacing, alternating on opposite sides of pole; first step at elevation 10 feet above finished grade.
- F. Grounding and Bonding Lugs: Welded 1/2-inch 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.
- G. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.
- H. Factory-Painted Finish: 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, "Solvent Cleaning," 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, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."
  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 Engineer from manufacturer's full range.

## 2.5 ALUMINUM POLES

- A. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.
- B. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.
  - 1. Shape: Per Drawings, tapered for 20ft and taller
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- D. Grounding and Bonding Lugs: Welded 1/2-inch 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.
- E. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.
  - 1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
  - 2. Finish: Same as pole and luminaire.
- F. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
- G. Aluminum Finish: 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. 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.

## 2.6 POLE ACCESSORIES

- A. Duplex Receptacle: 120 V, 20 A in a weatherproof assembly complying with Section 262726 "Wiring Devices" for ground-fault circuit-interrupter type.
  - 1. Recessed, 12 inches above finished grade.
  - 2. Nonmetallic polycarbonate plastic or reinforced fiberglass, weatherproof in use, cover, color to match pole, that when mounted results in NEMA 250, Type 3R enclosure.
  - 3. With cord opening.
  - 4. With lockable hasp and latch that complies with OSHA lockout and tag-out requirements.
  - 5. See drawings for specification and locations
- B. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.

## PART 3 - EXECUTION

### 3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
- D. Flag pole lighting to include adjustment after architect site review. Fixtures should be aimed for maximum flag lighting effect with minimal shadowing.

### 3.2 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
  1. Fire Hydrants and Storm Drainage Piping: 60 inches.
  2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet.
  3. Trees: 15 feet 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. Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of 6-inch- wide, unpaved gap between the pole or pole foundation and the edge of adjacent concrete slab. Fill unpaved ring with pea gravel to a level 1 inch below top of concrete slab.

### 3.3 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

- A. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."
- B. Remote Mounting of Drivers/Power Supplies: Do not exceed the manufacturer's recommended maximum distance between the fixture and the driver/power supply.

### 3.4 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 for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

### 3.5 GROUNDING

- A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."
  1. Install grounding electrode for each pole unless otherwise indicated.
  2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

City of Elgin  
Elgin Sports Complex Expansion -  
Phase 1

14106.002  
Issue For Bid  
Not For Construction

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

END OF SECTION



SECTION 265668 - S - EXTERIOR ATHLETIC LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes lighting for the following outdoor sports venues:
1. Soccer fields.

1.2 DEFINITIONS

- A. Coefficient of Variation (CV): A statistical measure of the weighted average of all relevant illumination values for the playing area, expressed as the ratio of the standard deviation for all illuminance values to the mean illuminance value.
- B. Fixture: See "Luminaire."
- C. Illuminance: The metric most commonly used to evaluate lighting systems. It is the density of luminous flux, or flow of light, reaching a surface divided by the area of that surface.
1. Horizontal Illuminance: Measurement in foot-candles, on a horizontal surface 36 inches above ground unless otherwise indicated.
  2. Target Illuminance: Average maintained illuminance level, calculated by multiplying initial illuminance by LLF.
  3. Vertical Illuminance: Measurement in foot-candles, in two directions on a vertical surface, at an elevation coinciding with plane height of horizontal measurements.
- D. LC: Lighting Certified.
- E. Light-Loss Factor (LLF): A factor used in calculating the level of illumination after a given period of time and under given conditions. It takes into account temperature, dirt accumulation on the luminaire, lamp depreciation, maintenance procedures, and atmospheric conditions. An LLF includes a recoverable light-loss factor.
- F. Luminaire: A complete lighting unit, internally lighted exit sign, or emergency lighting unit. Luminaires include lamps and the parts required to distribute light, position and protect lamps, and connect lamps to power supply. Note that "fixture" and "luminaire" may be used interchangeably and the "IES Lighting Handbook" uses "luminaire" over "fixture."
- G. Pole: Luminaire support structure, including tower used for large area illumination.
- H. Uniformity Gradient (UG): The rate of change of illuminance on the playing field, expressed as a ratio between the illuminances of adjacent measuring points on a uniform grid.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of lighting product.
1. Arrange in order of luminaire designation.
  2. Include data on features, accessories, and finishes.
  3. Include physical description and dimensions of the luminaires.
  4. Ballast, including BF, UL listing and recognition, ANSI certification, and Energy Independence and Security Act of 2007 compliance.
  5. Lamps, including life, output (lumens, CCT, and CRI), and energy-efficiency data.

6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides," of each lighting luminaire type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the luminaire as applied in this Project.
    - a. 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.
    - b. Manufacturer Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
  7. Means of attaching luminaires to supports and indication that 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. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For exterior athletic lighting indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings and specifications for construction of lighting system.
  2. Manufacturer's determination of LLF used in design calculations.
  3. Lighting system design calculations for the following:
    - a. Target illuminance.
    - b. Point calculations of horizontal and vertical illuminance, CV, and UG at minimum grid size and area.
    - c. Point calculations of horizontal and vertical illuminance in indicated areas of concern for spill light.
    - d. Calculations of source intensity of luminaires observed at eye level from indicated properties near the playing fields.
  4. Electrical system design calculations for the following:
    - a. Short-circuit current calculations for rating of panelboards.
    - b. Total connected and estimated peak-demand electrical load, in kilowatts, of lighting system.
    - c. Capacity of feeder required to supply lighting system.
  5. Wiring requirements, including required conductors, cables, and wiring methods.
  6. Structural analysis data and calculations used for pole selection.
    - a. Manufacturer Wind-Load Strength Certification: Submit certification that selected total support system, including poles, complies with AASHTO LTS-6-M for location of Project.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Coordination Drawings: Plans drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
  2. Luminaire support structures.
  3. Limits of athletic fields.
  4. Proposed underground utilities and structures.
  5. Existing underground utilities and structures.
  6. Athletic field support structures.

- B. Qualification Data: For qualified manufacturer.
- C. Welding certificates.
- D. Product Certificates:
  - 1. For each type of ballast for bi-level and dimmer-controlled luminaire, from manufacturer.
  - 2. For support structures, including brackets, arms, appurtenances, bases, anchorages, and foundations, from manufacturer.
- E. Field quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Manufacturer Qualifications: Manufacturer's responsibilities include fabricating sports lighting and providing professional engineering services needed to assume engineering responsibility.
  - 1. Engineering Responsibility: Preparation of delegated-design submittals and comprehensive engineering analysis by a qualified professional engineer.
- C. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory accredited under the NVLAP for Energy Efficient Lighting Products.
- D. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.
- E. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M.
  - 2. AWS D1.2/D1.2M.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of luminaires, lamps, and luminaire alignment products and to correct misalignment that occurs subsequent to successful acceptance tests. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, and unauthorized repairs and alterations from special warranty coverage.
  - 1. Luminaire Warranty: Luminaire and luminaire assembly (excluding fuses and lamps) shall be free from defects in materials and workmanship for a period of five years from date of Substantial Completion.
  - 2. Lamp Warranty:
    - a. Replace lamps and fuses that fail within 12 months from date of Substantial Completion.

- b. Provide replacement lamps for lamps that fail within months 13 thru 24 from date of Substantial Completion.
- 3. Alignment Warranty: Accuracy of alignment of luminaires shall remain within specified illuminance uniformity ratios for a period of five years from date of successful completion of acceptance tests.
  - a. Realign luminaires that become misaligned during the warranty period.
  - b. Replace alignment products that fail within the warranty period.
  - c. Verify successful realignment of luminaires by retesting as specified in "Field Quality Control" Article.
  
- B. Warranty Period: Two year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Musco Lighting.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Facility Type: Recreational or social facility.
- B. Illumination Criteria:
  - 1. Minimum average target illuminance level for each lighted area for each sports venue and for the indicated class of play according to IES RP-6.
  - 2. CV and maximum-to-minimum uniformity ratios for each lighted area equal to or less than those listed in IES RP-6 for the indicated class of play.
  - 3. UG levels within each lighted area equal to or less than those listed in IES RP-6 for the indicated speed of sport.
- C. Illumination Calculations: Computer-analyzed point method complying with IES RP-6 to optimize selection, location, and aiming of luminaires.
  - 1. Grid Pattern Dimensions: For playing areas of each sport and areas of concern for spill-light control, correlate and reference calculated parameters to the grid areas. Each grid point represents the center of the grid area defined by the length and width of the grid spacing.
  - 2. Spill-Light Control: Minimize spill light for each playing area on adjacent and nearby areas.
- D. Soccer Fields:

## PART 3 - EXECUTION

### 3.1 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 and communications conduit to verify actual locations of connections before pole or luminaire installation.
- C. Examine foundations for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Install cables in raceways, except when cables are installed within boxes and poles. Conceal raceways and cables.
  - 1. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.
- C. Coordination layout and installation of luminaires with other construction.
- D. Use web fabric slings (not chain or cable) to raise and set structural members. Protect equipment during installation to prevent corrosion.
- E. Install poles and other structural units level, plumb, and square.
- F. Except for embedded structural members, grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- G. Extend cast-in-place bolted base foundations 36 inches above grade, minimum.
- H. Install controls and ballast housings in cabinets mounted on support structure at least 10 feet above finished grade.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 ADJUSTING

- A. Adjust luminaires and supports to maintain orientation and aiming as recommended by manufacturer.

END OF SECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Protecting existing vegetation to remain.
  2. Removing existing vegetation.
  3. Clearing and grubbing.
  4. Stripping and stockpiling topsoil.
  5. Removing above- and below-grade site improvements.
  6. Disconnecting, capping or sealing, and removing site utilities and abandoning site utilities in place.
- B. Related Requirements:
1. Section 015000 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.
  2. Section 015639 "Temporary Tree and Plant Protection".
  3. Section 312000 "Earth Moving".

### 1.2 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. 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 in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings and indicated according to requirements in Section 015639 "Temporary Tree and Plant Protection".
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.4 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or salvaged or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.5 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. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

#### 1.6 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 by Owner or authorities having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged for the gabion wall and stockpile for Engineers review. .
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- E. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

### PART 2 - PRODUCTS

#### 2.1 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.

### PART 3 - EXECUTION

#### 3.1 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 according to requirements in Section 015639 "Temporary Tree and Plant Protection."

- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

### 3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.4 EXISTING UTILITIES

- A. Locate, identify, and disconnect utilities indicated to be abandoned in place.

### 3.5 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 2 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, and compact each layer to a density equal to adjacent original ground.

### 3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.

### 3.7 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.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, pavements, ynthetic turf fields and landscape.
3. Subbase course and base course for concrete and asphalt pavements.
4. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 316329 "Drilled Concrete Piers and Shafts" for excavation of shafts and disposal of surplus excavated material.
3. IDOT Standard Specifications for Road and Bridge Construction.

1.2 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preexcavation conference at Project site.
  - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
    - a. Personnel and equipment needed to make progress and avoid delays.
    - b. Coordination of Work with utility locator service.
    - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
    - d. Field quality control.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Geotextiles.
  - 2. Controlled low-strength material, including design mixture.
  - 3. Warning tapes.

### 1.5 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving 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 traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locator service for location where Project is located before beginning earth-moving operations.
- C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures
- D. Do not commence earth-moving operations until plant-protection measures specified in are in place.
- E. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification [Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487; free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 2-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve, CA-2.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve, CA-6.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve, CA-6.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve, CA-10.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve, CA-7.
- I. Sand: ASTM C 33/C 33M; fine aggregate.
- J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

### 2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven 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. Survivability: Class 2; AASHTO M 288.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
  - 1. Survivability: Class 2; AASHTO M 288.

### 2.3 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting, flowable concrete material produced from the following:
  - 1. Portland Cement: ASTM C 150/C 150M.
  - 2. Fly Ash: ASTM C 618, Class C or F.
  - 3. Normal-Weight Aggregate: ASTM C 33/C 33M, 3/8-inch 10-mm nominal maximum aggregate size.
  - 4. Foaming Agent: ASTM C 869/C 869M.
  - 5. Water: ASTM C 94/C 94M.

### 2.4 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Discharge to approved outfall or storm drain structure after being treated for sediment removal.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  2. If foundations are encountered during excavation that are larger than two (2) cubic yards, the contract sum will be adjusted per changes to the contract.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
1. Clearance: As indicated on drawings.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
  3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.

4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. 100 mm150 mmTrenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

- A. Notify Testing Agent when excavations have reached required subgrade.
- B. If Testing Agent determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below pavements and turf fields with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 20 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  1. Completely proof-roll subgrade in one direction[, repeating proof-rolling in direction perpendicular to first direction]. Limit vehicle speed to 3 mph.
  2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- D. Areas which do not pass proof-roll shall be scarified to a depth of 9 inches and allowed to reach near optimum moisture content, recompact and re-proof-rolled. This step shall be considered as base bid scope.
- E. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- F. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used.
  1. Fill unauthorized excavations under other construction, pipe, or conduit.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Prevent erosion in accordance with Erosion and Sediment Control requirements.
  1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course.

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of subbase material to a height of 12 inches over the pipe or conduit.
  - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.

G. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

### 3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place soil fill on subgrades free of mud, frost, snow, or ice.



3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 3. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
  - 1. Lawns or Unpaved Areas: Plus or minus 1 inch.
  - 2. Synthetic Turf and Pavements: Plus or minus 1/2 inch.

3.17 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Section 334600 "Subdrainage."
- B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of drainage aggregate on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of drainage aggregate, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
  - 1. Compact each drainage aggregate layer to 85 percent of maximum dry unit weight according to ASTM D 698.
- C. Drainage Backfill: Place and drainage aggregate material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each drainage aggregate layer to 85 percent of maximum dry unit weight according to ASTM D 698.
2. Place and compact impervious fill over drainage backfill in 6-inch- thick compacted layers to final subgrade.

### 3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
  1. Place base course material over subbase course under hot-mix asphalt pavement.
  2. Shape subbase course and base course to required crown elevations and cross-slope grades.
  3. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
  4. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

### 3.19 FIELD QUALITY CONTROL

- A. Inspections: Owner will engage a qualified special inspector to perform the following inspections:
  1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  2. Determine that fill material classification and maximum lift thickness comply with requirements.
  3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
  1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area but in no case fewer than three tests.
  2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 200 feet or less of trench length but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

### 3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
  
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
  
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
  - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 316329 - S - DRILLED CONCRETE PIERS AND SHAFTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Dry-installed or slurry displacement-installed drilled piers at Contractor's choice.
- B. Related Requirements:
  - 1. Sections 013200 "Construction Progress Documentation" and 013233 "Photographic Documentation" for recording preexisting conditions and drilled-pier progress.
  - 2. Section 015000 "Temporary Facilities and Controls."
  - 3. Section 033000 "Cast-in-Place Concrete".

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 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.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Shop Drawings: For concrete reinforcement detailing fabricating, bending, supporting, and placing.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the following:
  - 1. Steel reinforcement and accessories.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. An experienced installer that has specialized in drilled-pier work and who has had a minimum of 5 years experience in similar installations under like subsurface conditions.
  - 2. Require auger cast grout pile work to be under immediate control of firm's foreman who is experienced in this type of work and has supervised a minimum of five prior projects of similar magnitude and design.
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077, ASTM D 3740, and ASTM E 329 for testing indicated.
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.6 PROJECT CONDITIONS

- A. 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 elsewhere in the Project Manual.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Deformed-Steel Wire: ASTM A 496A 496M.
- D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain. Cut bars true to length with ends square and free of burrs.

2.2 CONCRETE MATERIALS

- A. Per Section 033000.

2.3 STEEL CASINGS

- A. Steel Pipe Casings: ASTM A 283/A 283M, Grade C, or ASTM A 36/A 36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1/D1.1M.
- B. Corrugated-Steel Pipe Casings: ASTM A 929/A 929M, steel sheet, zinc coated.
- C. Liners: Comply with ACI 336.1.

2.4 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 0.30 percent by weight of cement.
- D. Proportion normal-weight concrete mixture as follows:
1. Compressive Strength (28 Days): 4000 psi.
  2. Maximum Water-Cementitious Materials Ratio: 0.45
  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.

2.5 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M 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

3.1 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.

3.2 EXCAVATION

- A. In accordance with Section 312000 "Earth Moving."
- B. Prevent surface water from entering excavated shafts. Conduct water to site drainage facilities.
- C. 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.
- D. 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.
1. Do not excavate shafts deeper than elevations indicated.
- E. 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 if possible, or redrill, clean, and test slurry in excavation before concreting.
  2. Clean bottom of each shaft before concreting.
- F. 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.
- G. 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 Engineer for review before proceeding.

### 3.3 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.

### 3.4 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.

### 3.5 CONCRETE PLACEMENT

- A. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by a qualified independent testing and special inspecting 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.

### 3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner or their representative will engage a qualified special inspector to perform the following special inspections:
  - 1. Drilled piers.
  - 2. Excavation.
  - 3. Concrete.
- B. Testing Agency: Owner will 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 Engineer.
- D. Concrete Tests and Inspections: ASTM C 172 except modified for slump to comply with ASTM C 94/C 94M.
  - 1. Slump: ASTM C 143/C 143M; 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 C 1064/C 1064M; 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 C 31/C 31M; 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 C 39/C 39M; one set for each drilled pier but not more than one set for each truck load. Test one specimen at 7 days, 2 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 shall 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 Engineer, 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 Engineer 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 Engineer.
  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 is 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 and bottom of straight shaft.
  3. Actual drilled pier diameter at top, bottom, and bell.
  4. Top of rock elevation.
  5. Top of hardpan elevation.
  6. Description of soil materials.
  7. Description, location, and dimensions of obstructions.
  8. Final top centerline location and deviations from requirements.
  9. Variation of shaft from plumb.
  10. Shaft excavating method.
  11. Design and tested bearing capacity of bottom.
  12. Depth of rock socket.
  13. Depth of embedment into hardpan.
  14. Levelness of bottom and adequacy of cleanout.
  15. Properties of slurry and slurry test results at time of slurry placement and at time of concrete placement.
  16. Ground-water conditions and water-infiltration rate, depth, and pumping.
  17. 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.
  18. Description of soil or water movement, sidewall stability, loss of ground, and means of control.
  19. Bell dimensions and variations from original design.
  20. Date and time of starting and completing excavation.
  21. Inspection report.
  22. Condition of reinforcing steel and splices.
  23. Position of reinforcing steel.
  24. Concrete placing method, including elevation of consolidation and delays.
  25. Elevation of concrete during removal of casings.
  26. Locations of construction joints.
  27. Concrete volume.
  28. Concrete testing results.
  29. Remarks, unusual conditions encountered, and deviations from requirements.

3.7 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 OF SECTION

SECTION 321216 - S - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Requirements:
  - 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
  - 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by IDOT.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of IDOT for asphalt paving work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Prime Coat: Minimum surface temperature of 60 deg F.
  - 2. Tack Coat: Minimum surface temperature of 60 deg F.
  - 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
  - 4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
  - 5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

- 2.1 In accordance with General Notes and Standard Details.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding in accordance with Section 312000 Earth Moving. Do not proof-roll wet or saturated subgrades.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - 1. Clean contact surfaces and apply tack coat to joints.
  - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time.
  - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

### 3.3 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.4 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: [1/4 inch].
  - 2. Surface Course: [1/8 inch].
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.5 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION

SECTION 321316 - S - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes concrete paving and decorative concrete paving.
- B. Related Requirements:
  - 1. Section 033000 "Concrete" for "cast-in-place" concrete.
  - 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within decorative concrete paving and in joints between decorative concrete paving and other paving or adjacent construction.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:
    - a. Concrete mixture design.
    - b. Quality control of concrete materials and decorative concrete paving construction practices.
    - c. Jointing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of exposed color, pattern, or texture indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the following, from manufacturer:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Fiber reinforcement.
  - 4. Admixtures.
  - 5. Curing compounds.
  - 6. Applied finish materials.
  - 7. Bonding agent or epoxy adhesive.
  - 8. Joint fillers.

1.5 MOCKUPS

- A. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups of full-thickness sections of decorative concrete paving to demonstrate typical joints; surface color, pattern, and texture; curing; and standard of workmanship.
  - 2. Build mockups of decorative concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Engineer and not less than 96 inches by 96 inches.
  - 3. Provide color options to Engineer to select from no less than 2 weeks in advance of the construction of the mockups. Provide mockups for four (4) selected colors with final finish and sealer applied.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. Comply with Section 033000.

### 2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
  - 1. Use flexible or uniformly curved forms for curves of a radius of 100 feet or less. Do not use notched and bent forms.

### 2.3 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers standard offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Butterfield Color.
    - b. Scofield, L. M. Company.
    - c. Or approved equal.
- C. Water: Potable and complying with ASTM C 94/C 94M.

### 2.4 CURING AND SEALING MATERIALS

- A. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B, manufactured for colored concrete.
  - 1. For integrally colored concrete, curing compound shall be pigmented type approved by coloring admixture manufacturer.
  - 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.
- B. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type I, Class A, manufactured for use with colored concrete.
- C. Clear Acrylic Sealer: Manufacturer's standard, waterborne, nonyellowing and UV-resistant, membrane-forming, medium-gloss, acrylic copolymer emulsion solution, manufactured for colored concrete, containing not less than 15 percent solids by volume.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bomanite Corporation; Hydrocoat.
    - b. H&C Concrete Care Products; Infusion Water-Based Sealer.
    - c. Scofield, L. M. Company; CEMENTONE Clear Sealer.
    - d. BASF Kure-N-Seal 25 LV
    - e. Or approved equal

2.5 RELATED MATERIALS

- A. Chemical Etching: Muriatic (hydrochloric - HCL) sulfuric, phosphoric or citric acid such as "Grace Top-Cast Concrete Surface Retarder" or approved equal.

2.6 CONCRETE MIXTURES

- A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties.
- B. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- C. Concrete Mixtures:
  - 1. Compressive Strength (28 Days): In conformance to IDOT Class SI.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.



- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

### 3.5 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

### 3.6 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperature. Do not use.
- B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

### 3.7 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
  - 1. Elevation: 1/8 inch.
  - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
  - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
  - 4. Joint Spacing: 3 inches.
  - 5. Joint Width: Plus 1/8 inch, no minus.

### 3.8 REPAIR AND PROTECTION

- A. Remove and replace concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

- B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

### 3.9 INTEGRAL COLORED CONCRETE PAVING

- A. The finish shall provide an exposed aggregate finish without exposing the coarse aggregate in the concrete. The light etch finish shall be accomplished by the use of the releasing agent and shall be applied as recommended by the manufacturer.
- B. Integral Colored Concrete Paving where indicated on drawings:
  - 1. Coloring Method: .
    - a. Color: As selected by Engineer from manufacturer's full standard range.
    - b. Method: Per the manufacturer's written instructions.
  - 2. The acid solution is applied to the surface, and it reacts with the cement paste, dissolving it and leaving behind a rough texture. After applying the solution, rinse off thoroughly with clean water making sure all traces of the acid are removed.
  - 3. Apply sealer only when concrete substrate is completely dry according to manufacturer's written instructions.
  - 4. Allow sealer to completely dry before applying additional coats.
  - 5. Apply second coat at 90degrees to the direction of teh first coat using same application method and rate.
  - 6. Field Joint Patterning Method: Sawcut.

END OF SECTION

SECTION 321373 - S - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Cold-applied joint sealants.
  - 2. Joint-sealant backer materials.
  - 3. Primers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Paving-Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.

1.4 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Crafcoc Inc.; RoadSaver Silicone SL.
  - b. Dow Corning Corporation; 890-SL.
  - c. Pecora Corporation; 300 SL.
  - d. Sika; Sikaflex.

### 2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

### 2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
  1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of joint-sealant backings.
  - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
  - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
  
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
  - 1. Place joint sealants so they fully contact joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
  
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
  - 1. Remove excess joint sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

### 3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
  
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

### 3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within concrete paving.
  - 1. Joint Location:
    - a. Expansion and isolation joints in concrete paving.
    - b. Contraction joints in concrete paving.
    - c. Other joints as indicated.
  - 2. Joint Sealant: Single-component, self-leveling, silicone joint sealant .
  - 3. Joint-Sealant Color: Provide from manufacturer's full range to be reviewed and selected by Landscape Architect.

END OF SECTION

SECTION 321443 - S - POROUS UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid concrete pavers with openings between pavers filled with aggregate.
2. Aggregate setting bed for pavers.
3. This section is for Alternates 6 & 7.

B. Related Requirements:

1. Section 312000 "Earth Moving" for excavation and compacted subgrade.
2. Section 321316 "Concrete Paving" for cast-in-place concrete curbs that serve as edge restraints for porous paving.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Pavers.
2. Geotextiles.

- B. Sieve Analyses: For aggregate materials, according to ASTM C 136.

C. Samples:

1. Six full-size units of each type of unit paver indicated.
2. Aggregate fill.
3. Three, one pound, aggregate setting bed materials showing range of characteristic variations.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution for owner selected alternates. Mockup a 5 foot by 5 foot area in each paver field zone. Mockups are required to verify orientation, pattern, joint spacing, alignment, lippage and general workmanship.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Unload pavers so no damage occurs to units.
- B. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- C. Maintain units free from dirt and debris.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

- A. Source Limitations: Obtain each type of paver from single source that has resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C 936/C 936M, resistant to freezing and thawing when tested according to ASTM C 67, and made from normal-weight aggregates.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Unilock, Eco-promenade or comparable product by one of the following:
    - a. Unilock.
  - 2. Thickness: 3-1/8 inches.
  - 3. Face Size and Shape: 3-7/8 " x 11-7/8".
  - 4. Color: Sierra.
  - 5. Finish: Smooth Premier
  - 6. Edge: Rounded Bevel Edge
  - 7. Sealer: Easyclean, integrated sealer
- C. Attic Stock: Provide 2 pallettes of permeable pavers as attic stock for client use in repair and maintenance that are the same as the permeable pavers specified and as part of the same order and batch.

2.2 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with requirements in Section 312000 "Earth Moving" for subbase material.
- B. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with requirements in Section 312000 "Earth Moving" for base-course material.
- C. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
- D. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:
  - 1. Survivability: Class 2; AASHTO M 288.

2.3 FILL MATERIALS

- A. Aggregate Fill for Porous Paving: Graded, sound, crushed stone or gravel complying with ASTM D 448 for Size No. 8.
  - 1. Color: Provide manufacturer's range of colors as samples for Engineer selection..

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with porous paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for porous paving.

3.2 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Tolerances:
  - 1. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch unit-to-unit offset from flush.
  - 2. Variation from Level or Indicated Slope: Do not exceed 1/8 inch in 24 inches and 1/4 inch in 10 feet or a maximum of 1/2 inch.
- E. Provide curbs as indicated. Install curbs before placing unit pavers.

3.3 PAVER INSTALLATION

- A. Only install pavers when pavers, setting bed, base, subbase or aggregates are unfrozen.
- B. Set unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a 1/16-inch- minimum and 1/8-inch- maximum joint width. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size pavers.
  - 1. When installation is performed with mechanical equipment, use only unit pavers with lugs or spacer bars on sides of each unit.
- C. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.
  - 1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.



2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
  3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
  4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.
- D. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.
1. Before ending each day's work, place aggregate fill in installed porous paving except for 42-inch width of unfilled paving adjacent to temporary edges (laying faces).
  2. As work progresses to perimeter of installation, place aggregate fill in installed paving that is adjacent to permanent edges unless it is within 42 inches of laying face.
  3. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.
- E. As work progresses, remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Precast concrete wheel stops.

### 1.2 ACTION SUBMITTALS

- A. Product Data:
1. Precast concrete wheel stops.
- B. Sustainable Design Submittals:
1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- D. Samples for Verification: For wheel stops, 6 inches long, showing color and cross section; with mounting hardware.

## PART 2 - PRODUCTS

### 2.1 PARKING BUMPERS

- A. Precast Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete; 4000-psi minimum compressive strength; 4-1/2 inches high by 9 inches wide by 72 inches long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of three factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.
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. American Eagle Precast, LLC.
    - b. American Precast Concrete Inc.
    - c. Bush Concrete Products, Inc.
    - d. Cast-Crete USA, Inc.
    - e. Dura-Crete, Inc.
    - f. Granite Precasting and Concrete, Inc.
    - g. Oldcastle Precast, Inc.
    - h. Steps Plus, Inc.
  2. Source Limitations: Obtain wheel stops from single source from single manufacturer.
  3. Surface Appearance: Smooth, free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
  4. Surface Sealer: Manufacturer's standard salt-resistant, clear sealer, applied at precasting location.
  5. Mounting Hardware: Galvanized-steel spike or dowel, 1/2-inch diameter, 14-inch minimum length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation in accordance with manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wheel stops in accordance with manufacturer's written instructions unless otherwise indicated.
- B. Securely anchor wheel stops to substrate with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION

SECTION 321723 - S - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Painted markings applied to asphalt paving.
  - 2. Painted markings applied to concrete surfaces.

1.2 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the Illinois Accessibility Code.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement-marking substrate is dry and in suitable condition to begin pavement marking in accordance with manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.
- B. Allow asphalt paving or concrete surfaces to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. 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 asphalt paving or concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
  - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal..

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.

- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 321726 - S - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Requirements:
  - 1. Section 321316 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.4 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

1.5 WARRANTY

- A. Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in material or workmanship within five (5) year warranty period from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the Illinois Accessibility Code for tactile warning surfaces.
  - 1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

2.2 DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Metal Tiles: Accessible truncated-dome detectable warning metal tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
  - 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:
  - 2. Basis-of-Design Product: Subject to compliance with requirements, provide Neenah Foundry; Detectable Warning Plates - 4984 or comparable product by one of the following:
    - a. Advantage Tactile Systems.

- b. East Jordan Iron Works.
- 3. Material:
  - a. Cast Iron: Gray iron, ASTM A 48/A 48M, CL 35.
- 4. Shapes and Sizes:
  - a. Rectangular panel, 24 by 12 inches 24 by 24 inches, 24 by 36 inches, , and 24 by 60 inches as needed to fill walk width to within 2" of walk edge. .
- 5. Dome Spacing and Configuration: Manufacturer's standard compliant spacing, in manufacturer's standard pattern.
- 6. Mounting:
  - a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.

### 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Furnish Type 316 stainless-steel fasteners for exterior use.
  - 2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

### 3.3 INSTALLATION OF DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles:
  - 1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.
  - 2. Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
  - 3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch from flush.
  - 4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
  - 5. Clean tiles using methods recommended in writing by manufacturer.

3.4 CLEANING AND PROTECTION

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Engineer. Replace using tactile warning surfacing installation methods acceptable to Engineer.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION



## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes:
1. Base Bid
    - a. All materials, labor and equipment for installation of synthetic turf and base as indicated on drawings.
  2. Alternate No. 1
    - a. Replace rubber and sand infill with alternative infill.
    - b. Add shock absorbing resilient underlayment
- B. Related Requirements:
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUBMITTALS

- A. Submit the following:
1. Synthetic Turf - One (1) sample, approximately (1) square yard, of each color.
  2. Certified copies of independent (third-party) laboratory reports and ASTM tests as follows:
    - a. Pile Height, Face Weight and Total Fabric Weight - ASTM D418.
    - b. Primary and Secondary Backing Weights - ASTM D 418.
    - c. Grab Tear Strength - ASTM D 1682.
    - d. Tuft Bind - ASTM D1335.
  3. Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.
  4. The manufacturer/installer of the synthetic turf shall inspect the subbase and supply a Certificate of Subbase Acceptance for the purpose of obtaining manufacturer's warranty for the finished synthetic playing surface.
  5. Product information and computer generated shop drawings for the turf shall be prepared and contain all pertinent information regarding installation.
    - a. Seaming Plan including roll lengths and seam locations
    - b. Installation details; edge detail; inserts, etc.
    - c. Striping and field marking plan.
  6. Gradation analysis and 5 pound sample of all base stone materials.
  7. Warranty
    - a. Provide copy of manufacturer's warranty (8 year minimum) .
    - b. Provide copy of third-party insurance policy covering warranty.
  8. Proof of no PFAS in the manufacturing process or turf materials.

### 1.3 QUALITY ASSURANCE

- A. The Turf Contractor and the Turf Manufacturer must be experienced in the manufacture and installation of this specific type of synthetic turf system, and provide references of three (3) specific installations within the past five (5) years.
1. The turf contractor must provide competent workmen skilled in the installation of this specific type of synthetic turf. The designated supervisory personnel on the project must be certified in writing by the turf manufacturer as competent in the installation of this material, including joining seams. The manufacturer shall have a representative on site to certify installation and warranty compliance.
  2. The turf contractor shall provide evidence directly from the turf manufacturer that the installer is certified by the manufacturer to install this type of synthetic turf installation.

B. Testing

1. Contractor shall provide Head Injury Criterion (HIC) values, as determined and set forth using ASTM F355-E & F1292 protocols and additional requirements of the warranty. At 1.4m, the HIC score shall not exceed 1,000 during the warranty period.
2. Contractor shall provide G-max rating, as determined and set forth using ASTM F355 & F1936, Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials, Test Method A. System G-max rating shall not be less than 70 nor exceed 130 at installation. System shall not exceed a G-max rating of **150** during the warranty period.
3. Contractor shall provide two separate HIC and G-max tests, one at field Substantial Completion and another one year from Substantial Completion. Testing shall be performed by an independent, third party testing firm that has no manufacturer related ties or sponsorship.
4. Contractor shall provide infiltration testing per ASTM F2898-11, Permeability of Synthetic Turf Fields, for each 20,000 square feet of turf surface. Testing shall be completed on the aggregate surface prior to placement of any surfacing materials. All infiltration test results shall meet or exceed 40" per hour.
5. Contractor shall complete string line tests in the presence of the Engineer. Tests shall not exceed 30' o.c. The finish elevation of the base stone shall not vary more than 1/4" when compared with a 50' taught string line. Contractor will be required to correct areas out of tolerance and certify that corrections have been made prior to final acceptance.
6. Contractor shall provide an infill depth conformance survey. On a 50-foot grid over the finish surface of the turf, test for infill depth and submit for review. Contractor will be required to correct areas out of tolerance and certify that corrections have been made prior to final acceptance. Tolerance for infill shall be within 1/8 inch from the specified infill depths.
7. One year after substantial completion, Contractor shall provide another infill depth conformance survey. Contractor will be required to correct areas out of tolerance by adjusting and/or adding infill as needed and certify that corrections have been made.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured materials in original packages with seals unbroken and bearing manufacturer's labels indicating brand name and directions for storing.
- B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and Maximum temperature requirements for storage. Store units on flat surfaces.
- C. Protect UV-light sensitive materials from exposure to sunlight.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply surface system materials or components over wet, frozen, or excessively damp substrates if prohibited by manufacturer's written instructions or warranty requirements.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system to be performed according to manufacturer's written dimensions of other construction by field measurements.

1.6 WARRANTY

- A. The Contractor shall provide its Manufacturer's Warranty which guarantees the usability and playability of the synthetic turf system for its intended use. The warranty coverage shall not be prorated nor limited to the amount of the usage.

- B. The warranty must have the following characteristics:
1. Must provide full coverage for eight (8) years from the date of Substantial Completion
  2. Must warranty materials and workmanship.
  3. Must warrant that the materials installed meet or exceed the product specifications.
  4. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer a serviceable as a playable surface.
  5. Manufacturer's warranty shall be supported by a third-party insurance policy for the full eight (8) year period. The insurance policy shall be pre-paid, direct with the owner, and non pro-rated. The insurance policy shall cover full labor and material replacement of the entire system including backing, fibers, infill, seams, inlays, adhesives, and nailer boards.
  6. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. The synthetic turf and all components shall be acceptable for all levels of competition, including professional and collegiate levels of soccer and football. The turf fabric shall be manufactured and installed by a sole responsible entity.
- B. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified should be able to withstand full climatic exposure, be resistant to insect infestation, rot, fungus and mildew; to ultra-violet light and heat degradation, and shall have the basic characteristic of flow-through drainage allowing free movement of surface run off through the turf where such water may flow to the subbase and field drainage system.
- C. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use.
- D. The synthetic turf shall be olive green in color, 15 foot wide rolls. Stripping colors shall be as indicted on the drawings.

### 2.2 SYNTHETIC TURF AND INFILL

- A. Contractor shall provide one of the following turf systems:
- a. 2" pile height
  - b. Blended monofilament and slit film product, minimum 48 oz per square yard total fabric weight.
  - c. Minimum 6 pounds per square foot total infill weight (min 1.5 pounds sand to max 3 pounds sand)
  - d. FieldTurf: Vertex CORE
  - e. AstroTurf: Rhino Blend
  - f. Shaw: Legion NXT
  - g. Approved equal
- B. Infill materials shall pass toxicity testing on the European Standard EN 71-3 or equivalent US testing. Infill shall be a combination of SBR crumb rubber and silica sand. Angular and sub-angular particles are not acceptable.
1. Rubber
    - 1) 0.8 mm – 2.4 mm
    - 2) #18 sieve 100% passing

- 3) #35 sieve <80% passing
  - 4) #50 sieve <.5% passing
2. Sand
- 1) #16 sieve 100% passing
  - 2) #30 sieve <80% passing
  - 3) #50 sieve <5% passing

2.3 ALTERNATE No.1: ALTERNATIVE INFILL AND SHOCK ABSORBING RESILIENT UNDERLAYMENT

- A. Provide alternative infill
1. BrockFill supplied by Brock, 877-276-2587 or [www.brock-international.com](http://www.brock-international.com). Install at the rate of 1 lb of BrockFill plus 4 lbs of sand per square foot.
- B. Provide shock absorbing resilient underlayment
1. Brock #SP17 as supplied by Brock, 877-276-2587 or [www.brock-international.com](http://www.brock-international.com).

2.4 STITCHING CORD AND ADHESIVES

- A. Stitching cord for sewing seams of the turf and adhesives for field markings shall be as recommended by the turf manufacturer.

2.5 TURF CAPPING STONE

- A. Turf capping stone shall be Vulcan P210.

2.6 SEAMING TAPE

- A. Seaming tape shall be constructed of high tenacity polyurethane coated, woven nylon made especially for artificial turf applications with a minimum width of 15 inches, as recommended by the turf manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for the installation of the synthetic turf system.
- C. Adhesives for bonding knitted synthetic turf appropriately shall be as recommended by the synthetic turf manufacturer.

3.2 BASE STONE CONSTRUCTION

- A. The base stone slope gradation and direction shall match subgrade slope, unless otherwise noted.
1. The geotextile fabric shall be installed under the stone base.
  2. The drain system shall be installed as indicated on the drawings.
  3. The field base stone elevation shall not vary by more than 1" +/- . Any imperfections, divots, etc. in the base stone will be repaired to meet grade tolerance.
  4. All capping stone materials shall be provided and laser graded to meet finish grade tolerance and shall not vary more than ¼" when compared with a 50' taut string line.

3.3 BID ALTERNATE: SHOCK ABSORBING RESILIENT UNDERLAYMENT

- A. The shock absorbing material shall be installed according to the manufacturer's approved procedures by qualified installers and in accordance with approved shop drawings.
- B. All units must be straight and true when laid out. Each unit must form a common straight and true edge with the adjacent unit.
- C. Cut and adjust prior to seaming. All trim cuts shall be neat and clean.
- D. Seams shall be glued (if required in accordance with manufacturer's instructions). Adhesive shall be supplied or approved or recommended by the manufacturer.

3.4 SYNTHETIC TURF INSTALLATION

- A. The turf installer shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.
- B. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.
- C. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the turf manufacturer. Seaming tape is to be constructed of high tenacity polyurethane coated, woven nylon. Inlaid markings shall be adhered to the seaming tape with a two-part, high strength polyurethane adhesive applied per the turf manufacturer's standard procedures for outdoor applications. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field.
- D. Prior to infill installation, Engineer shall conduct a pre-fill inspection for the purpose of verifying striping seaming and other requirements.
- E. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a layered system of the manufacturer's standard infill products. The turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a minimum depth of 1-3/4 inches. The infill materials can only be applied when the turf fabric is bone dry.

3.5 FIELD MARKINGS

- A. Field markings and decorations shall be installed in accordance with approved project shop drawings, and shall be in color as indicated on drawings.

3.6 TESTING

- A. Gmax and HIC testing to be conducted prior to substantial completion and at 1 year after installation by turf installer.

3.7 OWNER'S TRAINING

- A. The Synthetic Turf Provider shall instruct the Owner's maintenance staff on the care and maintenance of the synthetic turf surface at an in-person, on-site meeting.
- B. Provide Five (5) complete maintenance manuals for the Owner.

- C. Furnish Five (5) copies of manufacturer's literature, samples, certifications, and laboratory analytical data for all items submitted as a part of this specification

3.8 CLEAN UP

- A. Contractor shall provide the labor, supplies and equipment, as necessary, for final cleaning of surfaces and installed items.
- B. The Owner shall determine if any remnants of new material shall become the property of the Owner. Deliver remnants to on campus location.
- C. The Contractor shall keep the area clean throughout the project and clear of debris. Dispose waste materials in accordance with local requirements.
- D. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes:
  - 1. Alternate No. 3
    - a. Synthetic turf surfacing for the Playground.
- B. Related Requirements:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
  - 2. Section 312000 "Earth Moving."

### 1.2 SUBMITTALS

- A. Submit the following:
  - 1. Synthetic Turf and Safety Subsurface System- One (1) sample each, approximately (1) square yard, of turf color.
  - 2. Certified copies of independent (third-party) laboratory reports and ASTM tests as follows:
    - a. Pile Height, Face Weight and Total Fabric Weight - ASTM D418.
    - b. Primary and Secondary Backing Weights - ASTM D 418.
    - c. Grab Tear Strength - ASTM D 1682.
    - d. Tuft Bind - ASTM D1335.
    - e. ASTM F 1292-04 "Standard for Impact Attenuation of Surface Systems Under and Around Playground Equipment".
    - f. IPEMA Certified safety subsurface system.
  - 3. Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.
  - 4. The manufacturer/installer of the synthetic turf shall inspect the subbase and supply a Certificate of Subbase Acceptance for the purpose of obtaining manufacturer's warranty for the finished synthetic playing surface.
  - 5. Shop drawings shall be prepared and contain all pertinent information regarding installation.
    - a. Seaming Plan
    - b. Installation details; edge detail; inserts, etc.
    - c. Striping and field marking plan.
  - 6. Gradation analysis and 5 pound sample of all base stone materials.
  - 7. Warranty
    - a. Provide copy of manufacturer's warranty.
    - b. Provide copy of third-party insurance policy covering warranty.
    - c.

### 1.3 QUALITY ASSURANCE

- A. The Turf Contractor and the Turf Manufacturer must be experienced in the manufacture and installation of this specific type of synthetic turf system specific to playground spaces, and provide references of three (3) specific installations within the past five (5) years.
  - 1. The turf contractor must provide competent workmen skilled in the installation of this specific type of synthetic turf. The designated supervisory personnel on the project must be certified in writing by the turf manufacturer as competent in the installation of this material, including joining seams. The manufacturer shall have a representative on site to certify installation and warranty compliance.
  - 2. The turf contractor shall provide evidence directly from the turf manufacturer that the installer is certified by the manufacturer to install this type of synthetic turf installation.

3. Not used.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured materials in original packages with seals unbroken and bearing manufacturer's labels indicating brand name and directions for storing.
- B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and Maximum temperature requirements for storage. Store units on flat surfaces.
- C. Protect UV-light sensitive materials from exposure to sunlight.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply surface system materials or components over wet, frozen, or excessively damp substrates if prohibited by manufacturer's written instructions or warranty requirements.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system to be performed according to manufacturer's written dimensions of other construction by field measurements.

#### 1.6 WARRANTY

- A. The Contractor shall provide its Manufacturer's Warranty which guarantees the usability and playability of the synthetic turf system for its intended use. The warranty coverage shall not be prorated nor limited to the amount of the usage.
- B. The warranty must have the following characteristics:
  1. Must provide full coverage for eight (8) years from the date of Substantial Completion
  2. Must warranty materials and workmanship.
  3. Must warrant that the materials installed meet or exceed the product specifications.
  4. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer a serviceable as a playable surface.
  5. Manufacturer's warranty shall be supported by a third-party insurance policy for the full eight (8) year period. The insurance policy shall be pre-paid, direct with the owner, and non pro-rated. The insurance policy shall cover full labor and material replacement of the entire system including backing, fibers, infill, seams, inlays, adhesives, and nailer boards.
  6. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. All components and their installation method shall be designed and manufactured for use on outdoor playground. The materials as herein after specified should be able to withstand full climatic exposure, be resistant to insect infestation, rot, fungus and mildew, anti-microbial; to ultra-violet light and heat degradation, and shall have the basic characteristic of flow-through drainage allowing free movement of surface run off through the turf where such water may flow to the subbase and field drainage system.



- B. The product shall include a resilient subsurface padding safety system shall be provided that is a closed cell expanded polypropylene panel. They system shall be IPEMA certified and provide fall height protection up to (12') twelve feet.
- C. The playground grass resilient synthetic turf and subsurface padding system layout shall be provided by the contractor and manufacturer to match the approved playground equipment sizes and appropriate fall heights and padding safety system and various thickness.
- D. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use.

## 2.2 PLAYGROUND TURF, ACCEPTABLE MANUFACTURERS

- A. Forever Lawn. Playground Grass Ultra, as manufactured by ForeverLawn Inc.
- B. Approved equal.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. All installation operations shall be performed by personnel directly employed by the manufacturer, full familiar with the materials and their application, under the full-time direction and supervision of a qualified technical supervisor employed by the manufacturer of the synthetic turf. Installation supervisors shall have a minimum of five (5) years experience.
- C. The surface to receive the playground turf shall be inspected and certified by the manufacturer as ready for the installation of the playground turf system.
- D. Adhesives for bonding knitted synthetic turf appropriately shall be as recommended by the playground turf manufacturer.
- E. Cord for sewing seams of the turf shall be as recommended by the playground turf manufacturer.

### 3.2 BASE STONE CONSTRUCTION

- A. The base stone slope gradation and direction shall match subgrade slope, unless otherwise noted.
  - 1. The geotextile fabric shall be installed under the stone base.
  - 2. The drain system shall be installed as indicated on the drawings.
  - 3. The field base stone elevation shall not vary by more than 1" +/- . Any imperfections, divots, etc. in the base stone will be repaired to meet grade tolerance.
  - 4. All capping stone materials shall be provided and laser graded to meet finish grade tolerance and shall not vary more than ¼" when compared with a 50' taut string line.

### 3.3 PLAYGROUND TURF INSTALLATION

- A. The turf installer shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

- B. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.
- C. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the turf manufacturer. Seaming tape is to be constructed of high tenacity polyurethane coated, woven nylon. Inlaid markings shall be adhered to the seaming tape with a two-part, high strength polyurethane adhesive applied per the turf manufacturer's standard procedures for outdoor applications. All seams shall be transverse to the field direction; i.e., run perpendicularly across the field.
- D. Prior to infill installation, Engineer shall conduct a pre-fill inspection for the purpose of verifying striping seaming and other requirements.
- E. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a layered system of the manufacturer's standard infill products. The turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a minimum depth of 1-3/4 inches. The infill materials can only be applied when the turf fabric is bone dry.

#### 3.4 OWNER'S TRAINING

- A. The Synthetic Turf Provider shall instruct the Owner's maintenance staff on the care and maintenance of the synthetic turf surface at an in-person, on-site meeting.
- B. Provide Five (5) complete maintenance manuals for the Owner.
- C. Furnish Five (5) copies of manufacturer's literature, samples, certifications, and laboratory analytical data for all items submitted as a part of this specification

#### 3.5 CLEAN UP

- A. Contractor shall provide the labor, supplies and equipment, as necessary, for final cleaning of surfaces and installed items.
- B. The Owner shall determine if any remnants of new material shall become the property of the Owner. Deliver remnants to on campus location.
- C. The Contractor shall keep the area clean throughout the project and clear of debris. Dispose waste materials in accordance with local requirements.
- D. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION

SECTION 323113 - S - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Chain-link fences.
  - 2. Swing gates.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete post footings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Fence and gate posts, rails, and fittings.
    - b. Chain-link fabric, reinforcements, and attachments.
    - c. Gates and hardware.
- B. Shop Drawings: For each type of fence and gate assembly.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Include accessories, hardware, gate operation, and operational clearances.
- C. Samples for Initial Selection: For each type of factory-applied finish.

1.3 INFORMATIONAL SUBMITTALS

- A. Delegated-Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Shop drawings shall meet content and format requirements for building permit submission as required by authorities having jurisdiction.

1.4 QUALITY ASSURANCE

- A. Provide the following upon request:
  - 1. Qualification Data: For professional engineer.
  - 2. Product Certificates: For each type of chain-link fence, and gate.
  - 3. Product Test Reports: For framework strength according to ASTM F 1043, for tests performed by a qualified testing agency.
  - 4. Field quality-control reports.
- B. Mockups: Build mockups to set quality standards for fabrication and installation.
  - 1. Build mockup for typical chain-link fence and gate, including accessories.
    - a. Size: 10-foot length of fence.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.6 WARRANTY

- A. Warranty: Repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to comply with performance requirements.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - c. Faulty operation of gate operators and controls.
  - 2. Warranty Period: One (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.
- B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to [ASCE/SEI 7]:
  - 1. Structure occupancy category I

R

- 2. Design Windspeed: 105 mph
- 3. Exposure Class C
- C. Minimum Post Size: Determine according to ASTM F 1043 for post spacing not to exceed 8 feet Schedule 40 steel pipe.
- D. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, latest edition, based on mesh size and pattern specified.
- E. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
  - 1. Fabric Height: As indicated on Drawings.
  - 2. Steel Wire for Fabric: Wire diameter of 0.192 inch (4.88 mm).
    - a. Mesh Size: 2 inches (50 mm) and 1 inch (25 mm) where indicated on drawings.
    - b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz./sq. ft. with zinc coating applied before weaving.
    - c. Polymer-Coated Fabric: PVC fused and bonded over zinc -coated steel wire.
      - 1) Color: Black, according to ASTM F 934.
    - d. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
  - 3. Selvage: Knuckled at both selvages.

2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043.

1. Metallic Coating for Steel Framework:
  - a. Zinc Coating min. 2oz/SF.
2. Polymer coating over metallic coating: PVC fused and bonded.
  - a. Color: Match chain-link fabric according to ASTM F 934.

#### 2.4 SWING GATES

- A. General: ASTM F 900 for gate posts.
  1. Gate Leaf Width: As indicated on drawings.
- B. Pipe and Tubing:
  1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; [protective coating and finish to match fence framework].
- C. Frame Corner Construction: Welded.
- D. Hardware:
  1. Hinges: 180-degree inward swing.
  2. Latch: Permitting operation from both sides of gate[ with provision for padlocking accessible from both sides of gate].
  3. Provide panic bar hardware where indicated.

#### 2.5 FITTINGS

- A. Provide fittings according to ASTM F 626.

#### 2.6 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. 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. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

#### 2.7 GROUNDING MATERIALS

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
  1. Connectors for Below-Grade Use: Exothermic welded type.
  2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
  1. Do not begin installation before final grading is completed.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
  - 1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
    - b. Concealed Concrete: Place top of concrete below grade as indicated on drawings to allow covering.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Intermediate and Bottom Rails: Secure to posts with fittings.
- G. Chain-Link Fabric: Apply fabric to inside of enclosing framework. Leave 2-inch bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- H. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.
- I. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side.

### 3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 PANIC BAR INSTALLATION

- A. Install panic bar according to manufacturer's written instructions, aligned and true to fence line and grade.

3.6 GROUNDING AND BONDING

A. Fence and Gate Grounding:

1. Install ground rods and connections at maximum intervals of 1500 feet.
2. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 500 feet.
3. Ground fence on each side of gates and other fence openings.
  - a. Bond metal gates to gate posts.
  - b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a ground rod located a maximum distance of 150 feet on each side of crossing.

- C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.

D. Connections:

1. Make connections with clean, bare metal at points of contact.
2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
4. Make above-grade ground connections with mechanical fasteners.
5. Make below-grade ground connections with exothermic welds.
6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.7 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

- B. Lubricate hardware and other moving parts.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION

SECTION 323223 - S - SEGMENTAL RETAINING WALLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes single- depth segmental retaining walls with soil reinforcement.
- B. Related Requirements:
  - 1. Section 013573 "Delegated Design Requirements and Procedures" for definitions, submittal procedures, responsibilities, and scheduling requirements associated with delegated design assignment indicated in this Section.
  - 2. Section 312000 "Earth Moving" for excavation for segmental retaining walls.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each color and texture of concrete unit required. Submit sections of units not less than 3 inches square.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For segmental retaining wall units and soil reinforcement, from manufacturer.
  - 1. Include test data for connection strength between segmental retaining wall units and soil reinforcement according to ASTM D 6638.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle concrete units and accessories to prevent deterioration or damage due to contaminants, breaking, chipping, or other causes.
- B. Store geosynthetics in manufacturer's original packaging with labels intact. Store and handle geosynthetics to prevent deterioration or damage due to sunlight, chemicals, flames, temperatures above 160 deg F or below 32 deg F, and other conditions that might damage them. Verify identification of geosynthetics before using and examine them for defects as material is placed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a registered design professional, as defined in Section 013573 "Delegated Design Requirements and Procedures" to design segmental retaining walls, using performance requirements and design criteria indicated.
  - 1. Material properties indicated in this Section shall be considered as minimum properties.
- B. Compliance Review: Qualified professional engineer responsible for segmental retaining wall design shall review and approve submittals and source and field quality-control reports for compliance of materials and construction with design.
- C. Structural Performance: Engineering design shall be based on the following loads and be according to **NCMA's "Design Manual for Segmental Retaining Walls."**
  - 1. Gravity loads due to soil pressures resulting from grades indicated.



## 2.2 SEGMENTAL RETAINING WALL UNITS

- A. Concrete Units: ASTM C 1372, Normal Weight, except that maximum water absorption shall not exceed 7 percent by weight and units shall not differ in height more than plus or minus 1/16 inch from specified dimension.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by a licensee of one of the following:
    - a. Allan Block Corporation.
    - b. Anchor Wall Systems, Inc.
    - c. GeoWestern, Inc.
    - d. ICD Corporation.
    - e. Keystone Retaining Wall Systems, Inc.; a Contech company.
    - f. Risi Stone Systems; a division of Rothbury International.
    - g. Rockwood Retaining Walls, Inc.
    - h. Tensar Earth Technologies, Inc.
    - i. Versa-Lok Retaining Wall Systems; a division of Kiltie Corporation.
    - j. Unilock
  - 2. Provide units that comply with requirements for freeze-thaw durability.
- B. Color: As selected by Engineer from manufacturer's full range if not using basis of design manufacturer.
- C. Shape and Texture: Provide units matching basic shape, dimensions, and face texture indicated by referencing manufacturer's pattern designation.
- D. Batter: Provide units that offset from course below to provide batter as specified on drawings.
- E. Cap Units: Provide cap units of shape indicated with smooth, as-cast top surfaces without holes or lugs.
- F. Special Units: Provide corner units, end units, and other shapes as needed to produce segmental retaining walls of dimensions and profiles indicated and to provide texture on exposed surfaces as indicated.

## 2.3 INSTALLATION MATERIALS

- A. Clips: Product supplied by segmental retaining wall unit manufacturer for use with units provided, made from nondegrading polymer reinforced with glass fibers.
- B. Cap Adhesive: Product supplied or recommended by segmental retaining wall unit manufacturer for adhering cap units to units below.
- C. Leveling Base and backfill and drainage fill: Comply with requirements in Section 312000 "Earth Moving."
- D. Drainage Fill: Comply with requirements in Section 334600 "Subdrainage."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of segmental retaining walls.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 RETAINING WALL INSTALLATION

- A. General: Place units according to NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions.
  - 1. Lay units in running bond.
  - 2. Form corners and ends by cutting units with motor-driven saw or splitting units with mason's hammer and chisel.
- B. Leveling Base: Place and compact base material to thickness indicated and with not less than 95 percent maximum dry unit weight according to ASTM D 698.
- C. First Course: Place first course of segmental retaining wall units for full length of wall. Place units in firm contact with each other, properly aligned and level.
  - 1. Tamp units into leveling base as necessary to bring tops of units into a level plane.
- D. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.
  - 1. For units with lugs designed to fit into holes in adjacent units, lay units so lugs are accurately aligned with holes, and bedding surfaces are firmly seated on beds of units below.
- E. Cap Units: Place cap units and secure with cap adhesive.

### 3.3 FILL PLACEMENT

- A. General: Comply with requirements in Section 312000 "Earth Moving" NCMA's "Segmental Retaining Wall Installation Guide," and segmental retaining wall unit manufacturer's written instructions.
- B. Fill voids between and within units with drainage fill. Place fill as each course of units is laid.
- C. Place, spread, and compact drainage fill and soil fill in uniform lifts for full width and length of embankment as wall is laid. Place and compact fills without disturbing alignment of units. Where both sides of wall are indicated to be filled, place fills on both sides at same time. Begin at wall and place and spread fills toward embankment.
  - 1. Use only hand-operated compaction equipment within 48 inches of wall, or one-half of height above bottom of wall, whichever is greater.
- D. Place drainage geotextile against back of wall and place layer of drainage fill at least [12 inches] [6 inches] wide behind drainage geotextile to within 12 inches of finished grade. Place another layer of drainage geotextile between drainage fill and soil fill.
- E. Place a layer of drainage fill at least 12 inches wide behind wall to within 12 inches of finished grade. Place a layer of drainage geotextile between drainage fill and soil fill.
- F. Place impervious fill over top edge of drainage fill layer.
- G. Slope grade at top of wall away from wall unless otherwise indicated. Slope grade at base of wall away from wall. Provide uniform slopes that will prevent ponding.

### 3.4 ADJUSTING

- A. Remove and replace segmental retaining wall construction of the following descriptions:
  - 1. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if Engineer approves methods and results.
  - 2. Segmental retaining walls that do not match approved Samples.

3. Segmental retaining walls that do not comply with other requirements indicated.
  - B. Replace units so segmental retaining wall matches approved Samples and mockups, complies with other requirements, and shows no evidence of replacement.

END OF SECTION

SECTION 323300 - S - SITE FURNISHINGS AND ORNAMENTAL FENCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Benches and Guardrails.
  - 2. Bicycle racks.
  - 3. Bollards.
  - 4. Removable Bollards.
  - 5. Pavilion Shelter.
  - 6. Playground Equipment.
  - 7. Flagpoles.
  - 8. Scoreboard.
  - 9. Ornamental Fence.
  
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts cast in concrete footings.
  - 2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.2 ACTION SUBMITTALS

- A. Submittal Compliance Form: If Basis-of-Design products are provided, Submittal Compliance Form may be submitted in lieu of required Product Data submittal and Samples submittal. Ensure compliance with requirements included in Section 013300 "Submittal Procedures."
  
- B. Product Data: For each type of product.
  
- C. Samples: For each exposed product and for each color and texture specified.
  
- D. Samples for Initial Selection: For units with factory-applied finishes.
  
- E. Samples for Verification: For each type of exposed finish, not less than 6-inch- long linear components and 4-inch- square sheet components.
  
- F. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.3 QUALITY ASSURANCE

- A. Provide the following upon request:
  - 1. Material Certificates: For site furnishings manufactured with preservative-treated wood.
    - a. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.5 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.

## PART 2 - PRODUCTS

### 2.1 BENCHES AND GUARDRAIL RAILS TO BE FABRICATED FROM SALVAGED TIMBER.

- A. Manufacturer: As a member of the contractor team, GH Woodworking & Sawmill will perform the wood working and saw milling services for benches and guardrail rails as identified in the specifications and drawings.
1. GH Woodworking & Sawmill
  2. 32023 N. Fish Lake Road, Round Lake, IL 60073
  3. Phone: 847.878.9340

### 2.2 BICYCLE RACKS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal:
- a. Manufacturer: Belson Outdoors
  - b. Model: U Bike Rack, CBBR-2UR-BK
  - c. Style: Surface mount with anti-theft anchors.
  - d. Color Finish: Galvanized and powder coated black.

### 2.3 BOLLARDS

- A. Bollard Construction:
1. Pipe OD: Not less than 6 inches.
    - a. Steel: Schedule 40 pipe.
  2. Style: Concrete filled with dome top.
  3. Overall Height: As indicated.
  4. Overall Depth: As indicated.
  5. Installation Method: As indicated.
- B. Steel Finish: Galvanized.
1. Color: Powder coat black.

### 2.4 REMOVABLE BOLLARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal:
1. Reliance Foundry
    - a. Model: R-7912 Steel bollard
    - b. Style: Removable with bollard receiver and closing, lockable plate.
    - c. Color Finish: Powder coat black.
    - d. Not used.
  2. Overall Height: As indicated.
  3. Overall Width: As indicated.
  4. Overall Depth: As indicated.

### 2.5 PAVILION SHELTER

- A. Manufacturer: Icon Shelter Systems, Inc. or approved equal.
1. Model: DS (Dual Slope) 36x64TM.
  2. Style: 8 Steel columns
  3. Roof Style: 24 ga Pre-Cut Multi Rib Roof over T&G
  4. Roof Slope: 6 & 4:12

5. Wood Roof Deck: Stained 2X6 Tongue and Groove Roof Deck
6. Steel Column Color/ Finish: Jet Black.
7. Roof Color/ Finish: Matte Black.
8. Wood Color/ Finish: Submit colors and finishes for Landscape architect and Owner review from manufacturers full range.
9. Gutters and Downspouts: Architectural style
10. Electrical cutouts: 6
11. Base Connection: Standard
12. Manufacturer to provide professional stamped structural engineer foundation design and calculations for shade structure.

## 2.6 PLAYGROUND EQUIPMENT

- A. Manufacturer: Little Tikes Commercial. See drawings.  
Supplier: Parkreation lani@Parkreation.com 847-419-7744
1. Alternate # 3 - Playground
  2. Model: As indicated.
  3. Color/ Finish: to be selected by landscape architect and owner from full range.

## 2.7 FLAGPOLES

- A. Manufacturer: Basis of Design - Poletech or approved equal. See drawings.
1. Model: Cone Tapered Ground Set Flagpole:
  2. Winch system: Internal Halvard.
  3. Materials: Aluminum
  4. Pole Heights: (1) - 35' pole for American flag; (2) - 25' poles for Illinois and Elgin flags.
  5. Flags: Owner supplied
  6. Color/ Finish: Anodized Black.
  7. Not used.

## 2.8 SCOREBOARD

- A. Manufacturer: Basis of Design - Daktronics. See drawings.  
Supplier: Sievert Electric: Brian Nied -(708) 771-1600
1. Model: FB-2018
  2. Dimensions: As indicated
  3. Control: All Sport Control (Wireless) ith MX-1 Mobile Control
  4. Options:
    - a. Team Name Message Center
    - b. Electronic Captions
    - c. Time Out Left Display
    - d. Border Stipe
    - e. Horn
  5. Color/ Finish: to be selected by landscape architect and owner from full range.
  6. Manufacturer to provide professional stamped structural engineer foundation design and calculations for scoreboard.

## 2.9 ORNAMENTAL FENCE

- A. Manufacturer: Basis of design shall be Ameristar Echelon II with Majestic top rails, aluminum and black finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

END OF SECTION

## SECTION 328400 – LANDSCAPE IRRIGATION

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. Furnish all labor, materials, supplies, equipment, tools and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, pumping station and guarantee/warranty as shown on the drawings, the installation details, and as specified herein.

#### 1.2 ITEMS OF WORK INCLUDED

- A. Items of work specifically included are:
  - 1. Procurement of all applicable licenses, permits, and fees including payment of all development, plant investment, or any other fees and permits associated with the purchase and installation of the tap.
  - 2. Coordination of Utility Location. (“Call Before You Dig”)
  - 3. Installation, connection of all sensors, and programming of irrigation controller.
  - 4. Installation and connection to irrigation central control system.
  - 5. Provision and connection of electrical power supply to the irrigation control system.
  - 6. Installation of pumping plant for irrigation system.
  - 7. Maintenance period.
  - 8. Sleeving for irrigation pipe and wire.

#### 1.3 ITEMS OF WORK NOT INCLUDED

- A. Items of work specifically excluded are:
  - 1. Excavation, installation and backfill of tap into municipal water line.
  - 2. Excavation, installation and backfill of water meter and vault.

#### 1.4 RELATED WORK

- A. Division 00 00 00 – Procurement and Contracting Requirements
  - 1. 00 01 15 – List of Drawing Sheets
- B. Division 01 00 00 – General Requirements
  - 1. 01 10 00 – Summary
  - 2. 01 11 00 – Summary of Work
  - 3. 01 33 23 – Shop Drawings, Product Data, and Samples
- C. Division 02 00 00 – Existing Conditions
- D. Division 32 82 00 – Irrigation Pumps
- E. Division 32 90 00 – Planting

#### 1.5 SUBMITTALS

- A. Submit samples under provisions of Contract Documents
- B. Deliver four (4) copies of all required submittals to the Owners' Representative within fifteen (15) days from the date of the Notice to Proceed.



- C. Materials List: Include, pipe, fittings, mainline components, water emission components, control system components, pumping equipment and all other components needed to construct a fully operating automatic irrigation system. At a minimum include all components specifically identified on the irrigation drawings. Quantities of materials need not be included.
- D. Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on the materials list. Highlight specific items to be utilized for construction of the irrigation system.
- E. Shop Drawings: Submit shop drawings called for in the installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to the installation detail.
- F. Project Record Drawings: Submit project record (As-Built) drawings to Owner prior to commencement of maintenance period per Contract Documents. Accurate and complete project record drawings will be required before the maintenance period begins.

## 1.6 RULES AND REGULATIONS

- A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.
- B. When the contract documents call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, provide the quality and size required by the contract documents.
- C. If quantities are provided either in these specifications or on the drawings, these quantities are provided *for information only*. It is the Contractor's responsibility to determine the actual quantities of all material, equipment, and supplies required by the project and to complete an independent estimate of quantities and wastage.

## 1.7 TESTING

- A. Notify the Owners' Representative three (3) days in advance of any testing.
- B. Pressure Test:
  - 1. Pipelines jointed with rubber gaskets or threaded connections may be subjected to a pressure test at any time after partial completion of backfill. Pipelines jointed with solvent-welded PVC joints shall be allowed to cure a minimum of 24 hours before testing. Pipelines installed with thrust blocks shall have the concrete cured for a minimum of seven (7) days before testing.
  - 2. Subsections of mainline pipe may be tested independently, subject to the review of the Owners' Representative.
  - 3. Furnish clean, clear water, pumps, labor, fittings, and all equipment necessary to conduct tests or retests.
  - 4. The test pressure shall not exceed the rated working pressure of the pipe.
    - a. Hydrostatic Pressure Test:
      - 1) Fill mainline pipe with water, purge all air out of the system. Subject mainline pipe to a hydrostatic pressure of 150 PSI for two hours. Test with mainline components installed. A 2 PSI pressure variation is allowed.
        - a) The use of an air compressor to provide pressure is not allowed.
      - 2) Fill lateral pipe with water, purge all air out of the system. Subject lateral pipe to a hydrostatic pressure of 75 PSI. Test with risers for sprinklers capped.
        - a) The use of an air compressor to provide pressure is not allowed.

- 3) Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
- 4) Leakage will be detected by visual inspection. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the pipe passes test.
  - a) Cement or caulking to seal leaks is prohibited.
- 5) The Owners' Representative reserves the option to furnish the gauges and metering devices for the tests.

C. Operational Test:

1. Prior to the Operational Test connect and configure all system sensors.
  - a. The flow sensor shall be operational and operated per the manufacturer's instructions to learn the flow for all zones to be tested. The flow shall be stored in the controller's memory.
  - b. The master valve shall be installed and connected to the controller, and fully operational.
  - c. All rain, wind, temperature, weather or other sensors specified on the plan shall be installed, connected, and fully operational.
2. Activate each remote-control valve in sequence from controller. The Owners' Representative will visually observe operation, water application patterns, and leakage.
3. Replace defective remote-control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
4. Replace, adjust, or move water emission devices to correct operation or coverage deficiencies.
5. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems.
6. Cement or caulking to seal leaks is prohibited.
7. Repeat test(s) until each lateral passes all tests.
8. The Owners' Representative will measure and record static and dynamic pressure at the point of connection and in the system mainline at various locations.
9. The Owner's Representative will measure and record dynamic pressure at various sprinklers and water emission devices.

1.8 CONSTRUCTION REVIEW

- A. The purpose of on-site reviews by the Owners' Representative is to periodically observe the work in progress and the Contractor's interpretation of the construction documents and to address questions with regards to the installation.
  1. Scheduled reviews such as those for irrigation system layout or testing should be scheduled with the Owners' Representative as required by these specifications.
  2. Impromptu reviews may occur at any time during the project.
  3. Final review will occur at the completion of the irrigation system and Record Drawing (As-Built) submittal.

1.9 GUARANTEE/WARRANTY AND REPLACEMENT

- 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.
  1. For a period of one year from commencement of the formal maintenance period, 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 repairs within seven (7) days of notification from the Owners' Representative.

2. Costs for all guarantee/warranty work shall be entirely paid for by the Contractor.
3. Contract documents govern replacements identically as with new work. Make replacements at no additional cost to the contract price.
4. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

## PART 2 - MATERIALS

### 2.1 QUALITY

- A. Use materials that are new and without flaws or defects of any type and are the best of their class and kind.

### 2.2 SUBSTITUTIONS

- A. Pipe sizes referenced in the Construction Documents are minimum sizes and may be increased at the option of the Contractor. Substitutions in pressure class of pipe shall be approved by the Irrigation Designer.

### 2.3 IRRIGATION PUMP, FILTER AND CONTROLS

- A. Provide all materials required for a fully functioning cistern pump and filter system to provide water to the irrigation system. See irrigation drawings and details for more information.
- B. Provide materials required by local code for installation of the pump, filter, controls, and associated components.

### 2.4 SLEEVING

- A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.
- B. Sleeving material beneath pedestrian pavements shall be Class 200 / Schedule 40 PVC bell end pipe with solvent welded joints.
- C. Sleeving beneath drives and streets shall be Class 200 PVC/ Schedule 40 PVC bell end pipe with solvent welded joints.
- D. Sleeving diameter: As indicated on the drawings and installation details or equal to twice the nominal diameter of the pipe or wiring bundle being sleeved.
  1. Furnish and install size sleeves for wiring bundles per the current NEC Conduit Fill calculations and charts.

### 2.5 PIPE AND FITTINGS

- A. Mainline Pipe and Fittings:
  1. Use rigid, unplasticized polyvinyl chloride (PVC) round pipe, National Sanitation Foundation (NSF) approved, extruded from material meeting the requirements of Cell Classification 12454 as defined in ASTM Standard D1784, with an integral belled end.
  2. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241 and ASTM Standard D2672. Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters which are not manufactured in Class 200.
    - a. Use solvent weld pipe for mainline pipe with a nominal diameter less than 3-inches or where a pipe connection occurs in a sleeve. Use Schedule 40/80, Type 1, Cell Classification 12454, PVC solvent weld fittings conforming to ASTM Standard D1784 and ASTM Standard D2466 (Schedule 40)/D2467 (Schedule 80). All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672. Use primer specifically approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564.

3. Contractor shall run a #14-AWG, direct bury, UL listed tracer wire by Paige Wire along the entire mainline length. Wire shall be continuous with wire splices only placed within valve boxes and labeled on the record drawing. No wires are to be exposed. Use purple jacketed wire for mainline runs. Tape the tracer wire to the pipe at 15-foot intervals. Label tracer wire runs in each valve box.
- B. Lateral Pipe and Fittings:
1. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241. Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters that are not manufactured in Class 200. All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672.
    - a. Use Schedule 40/80/120 conforming to the dimensions and tolerances established by ASTM Standard D1785. All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672. All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672.
      - 1) Use Schedule 40/80, Type 1, Cell Classification 12454, PVC solvent weld fittings conforming to ASTM Standard D1784 and ASTM Standard D2466 (Schedule 40)/D2467 (Schedule 80).
    - b. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of a type approved by the pipe manufacturer.
      - 1) Solvent welded pipe shall not be installed when the outside temperature drops below forty-five (45) degrees Fahrenheit.
    - c. Flexible high-density polyethylene (HDPE) pipe is an alternate to rigid PVC pipe.
      - 1) HDPE SDR-11.5 (100 PSI) polyethylene is an acceptable alternative to Class 200 PVC pipe for laterals. HDPE pipe sizes to be used are 1-inch, 1.25-inch, 1.5-inch, 2-inch, IPS sized and outside diameter controlled. HDPE pipe shall conform to ASTM D3035 and be manufactured to IPS dimensions.
      - 2) Use Type 1, cell classification 12454PVC as defined in ASTM Standard D1784 insert fittings conforming to ASTM Standard D2609 designed for use with flexible polyethylene (PE) pipe. Use stainless steel pinch clamps or worm gear clamps (including stainless steel screw) to join pipe and fittings.
- C. Specialized Pipe and Fittings:
1. Copper pipe: Use Type K drawn temper (hard or rigid) copper pipe conforming to ASTM Standard B88.
    - a. Use wrought copper or cast bronze fittings that are dezincification resistant and conform to ASTM Standard B75, soldered or threaded per the installation details. Use a 95% tin and 5% antimony solder. Use a thread sealant approved by the pipe manufacturer.
  2. Galvanized steel pipe: Use Schedule 40/80 conforming to ASTM Standard A123.
    - a. Use galvanized, threaded, Class 150, malleable iron fittings conforming to ASME Standard B16.3 and ASTM Standard A123.
  3. Use a dielectric union wherever a copper-based metal (copper, brass, bronze) is joined to an iron-based metal (iron, galvanized steel, stainless steel).
  4. Assemblies calling for pre-fabricated swing joints shall utilize SPEARS swing joints or approved equal. Swing joints shall be rated at 315 psi, and use O-ring, Buttress thread and street elbow construction.

5. Joint sealant:
  - a. Use only Teflon-type tape pipe joint sealant on plastic threads. Use nonhardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on metal threaded connections.
6. Marking Tape:
  - a. Mainline Pipe - Christy underground I.D. tape TA.DT.6.P.NPW.

## 2.6 MAINLINE COMPONENTS

- A. Main System Shutoff Valve: As per local practice and in compliance with local code.
- B. Winterization Assembly: As per local practice and in compliance with local code.
- C. Master Valve Assembly: As presented in the installation details.
- D. Flow Sensor Assembly: As presented in the installation details.
- E. Isolation Gate Valve Assembly: As presented in the installation details. Install a separate valve box over a 3-inch depth of 3/4-inch gravel for each assembly.
- F. Quick Coupling Valve Assembly: Double swing joint arrangement as presented in the installation details. Install at a height where key can be inserted, turned and valve pressurized without removing threaded handle.
- G. Combination Pressure Regulator/Wye-Strainer Assembly: As presented in the installation details. Install a separate valve box over a 3-inch depth of 3/4-inch gravel for each assembly.
- H. Air/Vacuum Relief Valve Assembly: As presented in the installation details.

## 2.7 SPRINKLER IRRIGATION COMPONENTS

- A. Remote Control Valve (RCV) Assembly for Sprinkler Laterals:
  1. As presented in the installation details. Use wire connectors and waterproofing sealant to join control wires to solenoid valves. Use standard identifications tags marked with controller name and station number. Install a separate valve box over a 3-inch depth of washed pea gravel for each assembly. Use 8-ounce minimum weight non-woven geotextile fabric underneath pea gravel and box assembly to prevent dirt and debris intrusion. Adjust valve flow control per manufacturer's recommendations prior to use.
    - a. Install decoder compatible with irrigation controller on each valve for communication on 2-wire control system.
  2. Sprinkler Assembly: As presented in the drawings and installation details.

## 2.8 CONTROL SYSTEMS COMPONENTS

- A. Irrigation Controller
  1. Controller – Hunter Industries A2C-75S-SS two-wire controller with LTE Cellular Cartridge.
    - a. The controller shall be mounted where indicated in the drawings.
    - b. Controller is to be installed and grounded per manufacturer recommendations.
    - c. Power to the controller will be provided by the electrician to the controller location. The contractor will be responsible for making the connection from the power drop to the controller.
    - d. The controller will be mounted as directed by the Owner. Provide and install a Paige lightning surge arrestor 250090LED on the power to the controller.
    - e. Controller to be capable of automatic adjustment of irrigation run times based on input from an on-site weather sensor.
    - f. Product manufacture and local distributor are to provide base training for the operation of the

controllers at no cost to the owner. The distributor is to have complete knowledge of the operation and programming background of the control system.

B. Instrumentation:

1. As presented in the drawings and installation details.
2. Weather Sensor
  - a. Sensor shall be manufactured by Hunter Industries , model SOLAR-SYNC
  - b. Sensor to have adjustable rain shut-off capability from 1/8” – 1” of rainfall.
  - c. Sensor to have freeze shut-off capability when the ambient temperature is 37°F or lower.
  - d. Sensor to be capable of processing weather data and providing input to the irrigation controller for automatic adjustment of irrigation run times.
  - e. Sensor to connect wirelessly to irrigation controller.
3. Flow Sensor
  - a. The irrigation controller shall get flow information from the pump station.
  - b. Wire flow sensor output from pump station to irrigation controller per manufacturers recommendations.

C. Control Wire:

1. Use American Wire Gauge (AWG) No.12/14 solid copper conforming to ASTM B-3 or ASTM B-8. Type UF or PE cable, UL approved for direct underground burial from the controller unit to each remote-control valve. Use American Wire Gauge (AWG) No.12 wire for common wire.
  - a. Two-Wire Cable:
    - 1) Use Two-wire cable shall be 14-AWG, 2-conductor, Maxi cable, as manufactured by Paige Wire.
    - 2) Cable shall have two, conductors conforming to ASTM B-33. Inner conductors are to be listed as Type UF/TWU by UL or ETL or CSA.
    - 3) Insulation shall be polyvinyl chloride, black and red.
    - 4) Cable assembly shall have the insulated conductors laid parallel within the jacket.
    - 5) Outer jacket shall be pressure extruded high density PE conforming to ICEA S-61-402 and NEMA WC5 Jacket Thickness of 3/64-inch minimum jacket material to completely fill interstices between the two insulated conductors.
    - 6) Provide five-feet of extra wire at each valve so that the decoder can be easily removed from the valve box and serviced.
    - 7) Refer to drawings for wire jacket colors. Wire color shall be continuous over its entire length.
    - 8) Use Decoder Cable Fusing Device for water-proof quick-disconnect isolation of 2-wire cable path for troubleshooting of damaged wire path sections.
  - b. Wire Color for tWO Wire Controllers:
    - 1) Active Two Wire Path 1                      Blue
    - 2) Active Two Wire Path 2                      Green
    - 3) Active Two Wire Path 3                      Red
    - 4) Active Two Wire Path 4                      Black
    - 5) Spare Two Wire Path                          Orange

- D. Splices: Use wire connectors with waterproof sealant. Wire connector to be of UV radiation resist plastic construction consisting of two pieces, one piece which snap locks into the other. Connector shall be pre-filled with non-hardening silicone gel. Utilize twist style wire connector provided with assembly to connect wires.
1. Wire connectors to meet requirements of UL Standard 486D
  2. Utilize DBR/Y-600 Black Splices
  3. Encase wiring not located near PVC irrigation pipe in PVC Schedule 80 electrical conduit. Utilize long sweep elbows for changes of direction.
- E. Warning tape: Detectable Warning Tape reading “Caution: Buried Electrical Line Below” shall be inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Tape shall be six inches wide, colored red.
- F. Grounding
1. All controllers and decoders are to be grounded as indicated on the drawings. Minimum grounding per details and per the ASIC detail for controller grounding.
  2. Grounding shall be a rod and plate arrangement for the controller.
  3. Grounding Rod
    - a. 5/8-inch diameter, UL listed, copper-clad ground rod, 8-feet in length, with a 10-AWG factory welded insulated conductor, 15-feet in length.
    - b. Manufacturer shall be Paige Wire, model number 182000IC10 or approved equal.
    - c. Clamps, wire nuts, and / or CADWELD “One-Shot” connectors are not approved for use.
    - d. Install rod per manufacturers guidelines as to not damage the rod or welded conductor.
    - e. Ground rods shall be placed in their own ten-inch round valve box.
  4. Grounding Plate
    - a. 4-inch by 36-inch copper ground plate with a 10-AWG welded insulated conductor, 10-feet in length.
    - b. Manufacturer shall be Paige Wire, model number 182201IC or approved equal.
    - c. Provide 50-pounds of ground enhancement material (GEM) / earth contact backfill on the top and the bottom of each plate, for a total of 100-pounds per plate.
    - d. Manufacture shall be Loresco, Paige Electric model number 1820058 or 1820059 based on site soil conditions or approved equal.
  5. All wire connections between the ground rod and ground plate leads to the surge suppression device shall be made via a Paige Wire re-enterable terminal connector, model number 270RC3 or approved equal.
  6. The Contractor will be responsible to provide earth ground of two-wire ohm reading of not more than ten-ohms or approved in writing from the manufacture or within manufacture’s acceptable range.
  7. The supplying distributor shall check all ohm readings with a ground resistance tester (commonly referred to as a “Megger”) and provide documentation, signed by the distributor, that all readings are under ten-ohms. The Contractor will be responsible for making adjustments to the grounding system to achieve this reading at no additional cost to the Owner.

## 2.9 OTHER COMPONENTS

- A. Tools and Spare Parts: Provide operating keys, servicing tools, test equipment, other items and spare parts indicated in the General Notes of the drawings.
1. Additionally, provide the following:

- a. Two operating keys for each type and size of manually operated valve.
  - b. Two keys for each type and size of quick coupler.
  - c. Two of each servicing wrench or tool needed for complete access, adjustment, installation of nozzles and repair of all spray, rotary and rotor type sprinklers.
  - d. Two 3" diameter pressure gauges and associated fittings to measure system pressure and pressure at spray, rotary and rotor type sprinklers and remote-control valves. Pressure gauge shall have a range of 0-160 PSI.
  - e. Two sets of keys for each controller, enclosure or equipment that requires keyed access.
    - 1) If required, keys shall be keyed to match other locks that the Owner possesses.
2. All instruction manuals, repair manuals, operating manuals and original paper work related to the products that were installed during construction of the irrigation system.
- B. Owner Stock: Include the following for owner stock for future replacements.
1. Five (5) of each type of spray and rotary sprinkler body.
  2. Five (5) of each type of rotor body.
  3. Ten (10) of each type, radius, arc, and nozzle of spray and rotary sprinkler.
  4. Ten (10) of each type and size of rotor nozzle.
  5. Three (3) of each type of drip operation indicator.
  6. Ten (10) of each type of drip emitter.
  7. Five (5) of each type of valve decoder.
  8. One (1) of each type of sensor decoder.
  9. Five (5) of each type of surge protector/arrestor.
  10. 100-foot continuous length of inline emitter drip tubing of each flow rate and inline emitter spacing.
  11. Ten (10) sets of waterproof connectors.
  12. Five (5) of each type and size of fitting; inline emitter, point source drip, sprinkler, sprinkler lateral and mainline.

### PART 3 - EXECUTION

#### 3.1 INSPECTION AND REVIEWS

- A. Site Inspections:
1. Verify site conditions and note irregularities affecting work of this section. Report irregularities to the Owners' Representative prior to beginning work.
  2. Beginning work of this section implies acceptance of all existing conditions.
  3. Contractor will be held responsible for coordination between landscape and irrigation system installation.
  4. Landscape material locations shown on the Landscape Plan shall take precedence over the irrigation system equipment locations. If irrigation equipment is installed in conflict with the landscape material locations shown on the Landscape Plan, the Contractor will be required to relocate the irrigation equipment, as necessary, at Contractor's expense.
- B. Utility Location (Call Before You Dig)
1. Arrange for and coordinate with local authorities the location of all underground utilities.
  2. Repair any underground utilities damaged during construction. Make repairs at no additional cost to



the contract price.

- C. Irrigation System Layout Review: Irrigation system layout review will occur after the staking has been completed. Notify the Owners' Representative three business days in advance of review. Modifications will be identified by the Owners' Representative at this review.

### 3.2 LAYOUT OF WORK

- A. Stake out the irrigation system. Adjust system layout from plans to conform to final approved landscape design. Items staked shall include: Sprinklers, pipe, control valves, manual drains, controller, and isolation valves, grounding locations and sleeving.
- B. Install all mainline pipe and mainline components inside of project property lines.

### 3.3 EXCAVATION, TRENCHING AND BACKFILLING

- A. Excavate to permit the pipes to be laid at the intended elevations and to permit work space for installing connections and fittings.
- B. Minimum cover (distance from top of pipe or control wire to finish grade):
  - 1. 24-inch / 18-inch over mainline pipe and over electrical conduit.
  - 2. 26-inch / 18-inch over control wire.
  - 3. 26-inch/18-inch over signal wire.
  - 4. 18-inch / 12-inch over lateral pipe to sprinklers.
  - 5. 8-inch over drip lateral pipe in turf or paved areas downstream of drip system zone control valves.
  - 6. 3-inch minimum mulch cover over drip lateral pipe in planting beds downstream of drip system zone control valves. PVC UV radiation resistant lateral pipe shall be installed directly on the soil surface under landscape fabric.
- C. Backfill only after lines have been reviewed and passed hydrostatic tests and accepted by the Owner.
  - 1. Excavated material is generally satisfactory for backfill. Backfill shall be free from rubbish, vegetable matter, frozen materials, and stones larger than 1/2-inch in maximum dimension. Remove material not suitable for backfill. Backfill placed next to pipe shall be free of sharp objects which may damage the pipe. All soil shall be screened and pass through a square opening 1/2" x 1/2".
  - 2. Backfill un-sleeved pipe and sleeves in either of the following manners:
    - a. Backfill and puddle the lower half of the trench. Allow to dry 24 hours. Backfill the remainder of the trench in 6-inch layers. Compact to density of surrounding soil.
    - b. Backfill the trench by depositing the backfill material equally on both sides of the pipe in 6-inch layers and compacting to the density of surrounding soil.
  - 3. Enclose pipe and wiring beneath roadways, walks, curbs, etc. in sleeves. Minimum compaction of backfill for sleeves shall be 95% Standard Proctor Density, ASTM D698-78. Conduct one compaction test for each sleeved crossing less than 50 feet long. Conduct two compaction tests for each sleeved crossing greater than 50 feet long. Costs for such testing and any necessary retesting shall be paid for by the Contractor. Use of water for compaction around sleeves, puddling, will not be permitted.
  - 4. Dress backfilled areas to original grade
  - 5. Where utilities conflict with irrigation trenching and pipe work, contact the Owners' Representative for trench depth adjustments.

### 3.4 SLEEVING AND BORING

- A. Install sleeving at a depth which permits the encased pipe or wiring to remain at the specified burial depth.
- B. Extend sleeve ends six inches beyond the edge of the paved surface. Cover pipe ends and mark with

stakes. Mark concrete with a chiseled "X" at sleeve end locations.

- C. Bore for sleeves under obstructions which cannot be removed. Employ equipment and methods designed for horizontal boring.

### 3.5 ASSEMBLING PIPE AND FITTINGS

#### A. General:

- 1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and deburr. Clean pipe ends.
- 2. Keep ends of assembled pipe capped to prevent dirt and debris intrusion. Remove caps only when necessary to continue assembly.

#### B. Mainline Pipe and Fittings:

- 1. Use only strap-type friction wrenches for threaded plastic pipe. Tighten threaded plastic pipe per pipe and fitting manufacturers recommendations.
- 2. PVC Solvent Weld Pipe:
  - a. Use primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.
  - b. Cure for 30 minutes before handling and 24 hours before allowing water in pipe.
  - c. Snake pipe from side to side within the trench.
- 3. Fittings: The use of cross and wye type fittings is not permitted.

#### C. Lateral Pipe and Fittings:

- 1. Use only strap-type friction wrenches for threaded plastic pipe. Tighten threaded plastic pipe per pipe and fitting manufacturers recommendations.
- 2. PVC Solvent Weld Pipe:
  - a. Use primer and solvent cement. Join pipe in the manner recommended by the manufacturer and in accordance with accepted industry practices.
  - b. Cure for 30 minutes before handling and 24 hours before allowing water in the pipe.
  - c. Snake pipe from side to side within the trench.
- 3. Polyethylene (PE) Pipe:
  - a. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
  - b. Snake pipe from side to side within the trench.
- 4. Fittings: The use of cross and wye type fittings is not permitted.

#### D. Specialized Pipe and Fittings:

- 1. Copper Pipe:
  - a. Buff surfaces to be joined to a bright finish. Coat with solder flux.
  - b. Solder so that a continuous bead shows around the joint circumference.
- 2. Galvanized Steel Pipe:
  - a. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
  - b. Use factory-made threads whenever possible. Field-cut threads will be permitted only where necessary. Cut threads on axis using clean, sharp dies.
  - c. Apply Teflon-type tape or pipe joint compound to the male threads only.

3. Pre-fabricated double swing joints: Install per manufacturer's recommendations.
4. Low Density Polyethylene Hose: Install per manufacturer's recommendations.
5. PVC Threaded Connections:
  - a. Use only factory-formed threads. Field-cut threads are not permitted.
  - b. Use only thread sealant recommended by pipe and fitting manufacturer.
  - c. When connection is plastic-to-metal, the plastic component shall have male threads and the metal component shall have female threads.
6. Make metal-to-metal, threaded connections with Teflon-type tape or pipe joint compound applied to the male threads only.

### 3.6 INSTALLATION OF MAINLINE COMPONENTS

- A. Main System Shut Off Valve: Install where indicated on the drawings.
- B. Winterization Assembly: Install where indicated on the drawings.
- C. Master Valve Assembly: Install where indicated on the drawings.
- D. Flow Sensor Assembly: Install where indicated on the drawings.
- E. Isolation Gate Valve Assembly:
  1. Install where indicated on the drawings.
  2. Locate at least 12-inches from and align with adjacent walls or edges of paved areas.
- F. Quick Coupling Valve Assembly: Install where indicated on the drawings.
- G. Combination Pressure Regulator/Wye-Strainer Assembly: Install where indicated on the drawings.
- H. Manual Drain Valve Assembly: Install where indicated on the drawings and at other low points in the mainline piping. Determine additional low points after staking mainline and approve locations with Owner.
- I. Air/Vacuum Relief Valve Assembly: Install where indicated on the drawings and at other high points in the mainline piping. Determine additional high point after staking mainline and approve locations with Owner.

### 3.7 INSTALLATION OF SPRINKLER IRRIGATION COMPONENTS

- A. Remote Control Valve (RCV) Assembly for Sprinkler Laterals:
  1. Flush mainline before installation of RCV assembly.
  2. Install where indicated on the drawings. Wire connectors and waterproof sealant shall be used to connect control wires to remote control valve wires. Install connectors and sealant per the manufacturer's recommendations.
  3. Install only one RCV to a valve box. Locate valve box at least 12-inches from and align with nearby walls or edges of paved areas. Group RCV assemblies together where practical. Arrange grouped valve boxes in rectangular patterns. Allow at least 12-inches between valve boxes.
  4. Adjust RCV to regulate the downstream operating pressure.
  5. Attach ID tag with controller station number to control wiring.
- B. Sprinkler Assembly:
  1. Flush lateral pipe before installing sprinkler assembly.
  2. Install per the installation details at locations shown on the drawings.
  3. Locate rotary sprinklers 6-inches from adjacent walls, fences, or edges of paved areas.
  4. Set sprinklers perpendicular to the finish grade.
  5. Supply appropriate nozzle or adjust arc of coverage of each sprinkler for best performance.

6. Adjust the radius of throw of each sprinkler for best performance.

### 3.8 INSTALLATION OF CONTROL SYSTEM COMPONENTS

#### A. Irrigation Controller Unit:

1. The location of the controller unit as depicted on the drawings is approximate; the Owners' Representative will determine the exact site location upon commencement of contract. during sprinkler layout review.
2. Lightning protection: Ground rods are to have a minimum diameter of 3/4" and a minimum length of 10 feet. These are to be driven into the ground in a vertical position or an oblique angle not to exceed 15 degrees at location 10 feet from the electronic equipment, the ground plate, or the wires and cables connected to said equipment, as shown in the irrigation details. The rod is to be stamped with the UL logo. A 6 AWG solid bare copper wire (no more than 12 feet long) shall be connected to the ground rod by the installer using a Cadweld GR1161G" One-Shot" welding kit. This wire shall be connected to the electronic equipment ground lug as shown in the detail above.
3. Lightning protection: Provide on all remote-control valve wiring as recommended by the manufacturer. Provide other components such as ground rod, grounding wire, etc., to manufacturer's recommendations.
4. Install primary surge protection arrestors on incoming power lines.
5. Install one valve output surge protection arrestor on each control wire and one for the common wire.
6. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with the identification number (see drawings) of the remote-control valve to which the control wire is connected.
7. Connect control wires to the corresponding controller terminal.

#### B. Instrumentation:

1. Install sensors per the installation details and manufacturer's recommendations. Install at locations shown on the drawings.
2. Install electrical connections between irrigation controller and sensors per manufacturer's recommendations.

#### C. Control Wire:

1. Bundle control wires where two or more are in the same trench. Bundle with pipe wrapping tape spaced at 10-foot intervals.
2. Provide a 24-inch excess length of wire in an 8-inch diameter loop at each 90-degree change of direction, at both ends of sleeves, and at 100-foot intervals along continuous runs of wiring. Make wiring loop by turning control wire 5 turns around 1-inch pipe. Coil 24-inch length of wire within each remote-control valve box.
3. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box which contains an irrigation valve assembly, or in a separate 6-inch round valve box. Use same procedure for connection to valves as for in-line splices.
4. Unless noted on plans, install wire parallel with and under PVC mainline pipe. If wire is installed adjacent to section of metal pipe, separate wire from pipe minimum of 6-inches and install wire in PVC conduit.
5. Encase wire not installed with PVC mainline pipe in electrical conduit.

- D. Warning tape: Detectable Warning Tape shall be installed approximately 6 inches above mainline pipe where required or where specified.

### 3.9 INSTALLATION OF OTHER COMPONENTS

- A. Tools and Spare Parts:
  - 1. Prior to the Pre-Maintenance Review, supply to the Owner operating keys, servicing tools, test equipment, and any other items indicated on the drawings.
  - 2. Prior to Final Review, supply to the Owner the spare parts indicated in the General Notes on the drawings.
- B. Other Materials: Install other materials or equipment shown on the drawings or installation details to be part of the irrigation system, even though such items may not have been referenced in these specifications.

### 3.10 PROJECT RECORD (AS-BUILT) DRAWINGS

- A. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Documents. Keep documents current. Do not permanently cover work until as-built information is recorded.
- B. Record pipe and wiring network alterations. Record work which is installed differently than shown on the construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve, each backflow prevention device, each controller or control unit, each sleeve end, each stub-out for future pipe or wiring connections, and other irrigation components enclosed within a valve box.
- C. Prior to Final Review, purchase from the Owners' Representative a reproducible mylar copy of the drawings. Using technical drafting pen, duplicate information contained on the project drawings maintained on site. Label each sheet "Record Drawing". Completion of the Record Drawings will be a prerequisite for the Final Review.

### 3.11 MAINTENANCE

- A. Upon completion of Final Review, maintain irrigation system for a duration of 30 calendar days. Make periodic examinations and adjustments to irrigation system components to achieve the most desirable application of water.
- B. Following completion of the Contractor's maintenance period, the Owner will be responsible for maintaining the system in working order during the remainder of the guarantee/warranty period, for performing necessary minor maintenance, for trimming around sprinklers, for protecting against vandalism, and for preventing damage during the landscape maintenance operation.

### 3.12 CLEAN-UP

- A. Upon completion of work, remove from the site all machinery, tools, excess materials, and rubbish.

END OF SECTION

SECTION 329100 - S - SOIL PREPARATION (TOPSOIL)

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies all soil materials designated as "Topsoil" on the drawings or in the specifications. Supply topsoil for landscape work (seeding and planting) from on-site sources, off-site sources or both.
- B. Related Requirements:
  - 1. Section 311000 "Site Clearing" for on-site topsoil stripping and stockpiling.
  - 2. Section 329210 "Lawns" for seed bed soil requirements.
  - 3. Section 329300 "Exterior Planting" for soil mixtures that include topsoil.

1.2 REFERENCES

- A. ASTM International, as referenced herein as ASTM.
- B. US Department of Agriculture (USDA) Handbook No. 60 – Diagnosis and Improvement of Saline and Alkali Soils.

1.3 ACTION SUBMITTALS

- A. Source Quality Control:
  - 1. Material Test Reports: Conduct Topsoil testing for existing on-site surface topsoil, and imported topsoil from off-site sources.
  - 2. Sample: Provide 1 quart samples for each topsoil test unit (including source).
  - 3. Conduct all topsoil sampling and testing prior to delivery from off-site sources, and prior to stripping and stockpiling from on-site sources.

1.4 INFORMATIONAL SUBMITTALS

- A. Field Quality Control:
  - 1. Obtain samples, test materials and submit field test reports as described under Articles 2.1 and 3.1 below.

1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Soil-Testing Laboratory Qualifications: The contractor shall engage an independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
  - 1. Topsoil may be obtained from onsite sources or may be imported provided the material meets this specification. Any screening and disposal or amending required for onsite topsoil to meet particle size and other requirements shall be considered as base bid scope.
  - 2. Topsoil for landscape work shall be a fertile, friable, sandy loam or loam surface soil without admixture of subsoil screened to be free of stones, stumps, root, trash, debris, and other materials deleterious to plant growth.

3. Particle Size Distribution of Topsoil:

a. For sodded lawns and shrub and perennial beds:

Sieve Designation	Percent Passing
1 inch screen	100
1/4 inch screen	97 - 100
No. 10 U.S.S. mesh sieve	35 - 100
No. 140 U.S.S.	15 - 35

b. For all seeded and bioswale areas:

Sieve Designation	Percent Passing
2 inch screen	100
1 inch screen	75 - 100
1/4 inch screen	50 - 100
No. 10 U.S.S. mesh	25 - 50

4. The pH range shall be 6.5 to 8.4.
5. Organic content shall not be less than 4 percent and not greater than 20 percent.
6. Clay content determined by Bouyoucous Hydrometer Test: between 5 percent and 15 percent.
7. Base percentages on dry weight of the sample

2.2 SOURCE QUALITY CONTROL:

A. Laboratory Test Reports:

1. Conduct topsoil testing for each soil test unit as follows:
  - a. Existing off-site location(s): 1 sample per acre of site to be excavated.
  - b. Existing on-site areas prior to stripping topsoil: 1 sample per acre of site to be excavated and each sub-area delineated by pavements, building and other site features that fragment the site into testing units less than 1 acre but larger than 0.25 acres in size.
  - c. Plant mixture: Plant mixture shall be tested twice. First - test topsoil as indicated above. Second - test plant mixture after integrating mixture ingredients as identified under Part 2 of Exterior Planting specification.
2. Submit all test reports for approval.
3. Fertility: For each unamended soil type, test topsoil for organic materials, pH, phosphate, potash content, calcium, magnesium, zinc, iron, and manganese.
4. Physical Properties: Determine percent sand, silt and clay and textural classification (USDA) by hydrometer method. Identify all foreign materials such as rock, roots, and vegetation.
5. Recommendations: Based on the test results, the independent testing laboratory shall state recommendations for soil treatments and soil amendments to be incorporated prior to seeding and planting. List recommendations in weight per 1000 square feet for lawn area and cubic yard of plant mixture. Recommendations shall include; nitrogen, phosphorus, and potash nutrients and all soil amendments required for the long-term growth of the specified plants and turf.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Sampling: Each soil test unit shall be a composite of five to seven subsamples taken the full depth of proposed source for each acre of surface area. For on-site stockpiles, discard upper 6 inches of soil before sampling. For large stockpiles, partial excavation will be required for collection of representative samples. Include site plan verifying the locations of all topsoil sampling. Topsoil test reports shall be accompanied with each sample unit for review and approval by the Engineer.

- B. Testing methods and written recommendations when not references elsewhere, shall comply with USDA's Handbook No. 60. Nutrient data to be given in parts per million (ppm) dry soil.
- C. Topsoil shall be as defined in ASTM D5268.
- D. Soil pH shall be tested in accordance with ASTM D4972.
- E. Test for organic material by using ASTM D2974.

END OF SECTION



PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding
2. Sodding
3. Mulching
4. Erosion control blanket - slope stabilization
5. Turf renovation
6. Maintenance
7. Warranty

B. Related Requirements:

1. Section 311000 "Site Clearing" for stripping and using on-site topsoil.
2. Section 312000 "Earth Moving" for mass grading of the site.
3. Section 312500 "Soil Erosion and Sedimentation Control" for soil stabilization during construction.
4. Section 328400 "Landscape Irrigation" for turf and planting irrigation systems.
5. Section 329100 "Soil Preparation (Topsoil)" for lawns and plant mixture amendment.
6. Section 329300 "Exterior Plantings" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.2 REFERENCES AND REGULATORY REQUIREMENTS

- A. United States Department of Agriculture (USDA), Federal Seed Act - labeling and purity standards and miscellaneous requirements.
- B. State Seed Laws - where applicable.
- C. Association of Official Seed Analysts (AOSA): "Rules for Testing Seed".
- D. Turfgrass Producers International (TPI): Guidelines for Turfgrass Sod.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to grasses, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Pure Live Seed (PLS):  $(\text{percent germination} \times \text{percent purity}) / 100 = \text{Percent PLS}$
- E. Topsoil: Existing, on-site soil and Imported soil that may have been modified with soil amendments and fertilizers to produce a soil mixture best for lawn growth. See Section 329100 "Soil Preparation (Topsoil)" and drawing designations for topsoil.

- F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before topsoil is placed.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site.

#### 1.5 ACTION SUBMITTALS

##### A. Product Data:

1. Erosion control blanket and anchors.
2. Fertilizers - from manufacturer.
3. Herbicides: Product label, manufacturer's product data sheet, application instructions and application equipment.
4. Seeding and mulching equipment.
5. Straw Mulch tackifier - materials and equipment.
6. Lawn maintenance equipment.

##### B. Source Quality Control:

1. Test Report:
  - a. Topsoil: Test reports including soil amendments and fertilization rates for each seed mix. Refer to Section 329100 Soil Preparation (Topsoil).
2. Certifications/Licenses:
  - a. Certification of Grass Seed 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 (PLS), germination, weed seed, year of production, and date of packaging. Include identification of source, name and telephone number of supplier.
  - b. Certification of sod from proposed sod supplier that identifies quality standard, turf species stating the botanical and common names, proportions of each species in the sod, composition of the root zone soil in which the sod has been grown, and date the sod was planted. Include identification of source, name and telephone number of supplier.

##### C. Field Quality Control:

1. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Engineer indicating dates for delivery, installation, and Substantial Completion for all landscape work.
2. Maintenance Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under Part 3.13 of this section. Coordinate landscape maintenance with other applicable Sections (Native Seeding, Exterior Plantings, Irrigation) and combine all maintenance activities into one plan of action. The schedule shall be comprehensive .

3. Irrigation Plan: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plan shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and winterization procedures. In locations where no automatic irrigation system has been installed, describe means, methods and frequencies for hand watering. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Engineer. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e., system can be set to water one area for the required maintenance period) and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Engineer. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

#### 1.6 INFORMATIONAL SUBMITTALS

##### A. Qualification Data:

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the seeding, planting, irrigation, and maintenance technicians.
3. License certificates for pesticide applicator that includes "Turfgrass" category.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.
- B. Sod : Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.
- C. Straw Mulch: Straw mulch shall be stored off the ground under a cover that provides protection from moisture and humidity.
- D. Bulk Materials:
  1. Do not dump or store bulk materials near structures, utilities, walkways, and pavements, or on existing turf areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery of bulk materials with appropriate certificates.

#### 1.8 SCHEDULING

##### A. Work Schedule:

1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
  - a. Submittal schedule.
  - b. Delivery of materials to the site.
  - c. Layout of seed bed locations on the site.
  - d. Installation including; topsoil placement, fine grading , sodding , seeding , mulching and slope stabilization.
  - e. Substantial Completion of the work.
2. Update schedule monthly to reflect progress of the work.

B. Seasonal Limitations:

1. Seed mixes shall be installed during planting seasons normally recognized in the job locality.
2. Cool Season Grasses including Low Mow Fescue Mixes: Install during the spring and fall only when soil temperatures are between 50 and 65 degrees Fahrenheit and daytime air temperatures are 60 to 75 degrees Fahrenheit.
  - a. Approximate spring installation: Between April 1 and May 15.
  - b. Approximate fall installation: Between August 15 and September 30 but no later than 60 days before the first average annual frost date.
  - c. Dormant seeding: Late fall/early winter or late winter. Daytime soil temperatures shall not exceed 50 degrees Fahrenheit.
3. Warm Season Grasses: Install during the spring and summer when soil temperatures are at or above 70 degrees Fahrenheit and daytime air temperatures are between 80 and 95 degrees Fahrenheit.
  - a. Approximate spring installation: Between June 1 and June 30.
  - b. Approximate fall installation: Between August 15 and September 30 but no later than 45 days before first average annual frost date.
  - c. Dormant seeding: Late fall/early winter or late winter. Daytime soil temperatures shall not exceed 50 degrees Fahrenheit.
4. Sodding: Comply with Cool Season Grass dates identified above.
  - a. Dormant sodding: Not permitted.
5. If special circumstances warrant installation outside the normal installation season, submit a written request to the Engineer describing conditions and stating the proposed variance. Seeding and Sodding outside the specified seasons may extend warranty obligations and will be dependent upon the extent of the variance.
6. Weather limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
7. Coordination with Plantings: Plant trees, shrubs, and other plants after finish grades but prior to lawn installation unless otherwise indicated. When planting trees, shrubs, and other plants after lawn installation, protect completed areas, and promptly repair damage caused by planting operations.

1.9 WARRANTY, MAINTENANCE AND ACCEPTANCE

A. Substantial Completion:

1. The Substantial Completion inspection shall occur for the entire project and only one Notice of Substantial Completion will be issued. Phased approvals will not be permitted. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion or correction.
2. The Substantial Completion inspection for the landscape shall occur in phases based upon the phasing plan approved at the beginning of the work by the Engineer. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion, replacement, or correction.

3. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
  4. Substantial Completion will be provided for all lawn areas complying with the following:
    - a. Engineer approval of all specified submittals.
    - b. The work shall be 100 percent complete (including all site preparation , earthwork , topsoil , seeding , sodding , plugging , mulching , erosion control blanket , planting , irrigation and clean-up), and ready for inspection.
  5. After receiving a Notice of Substantial Completion, warrant and maintain all lawn areas (see Part 3.13) in a vigorous, well-kept condition until Final Acceptance.
- B. Final Acceptance:
1. Approximately two weeks prior to the expiration of the warranty and maintenance period (or sooner if plantings are included in the inspection), the Engineer will conduct an inspection of all lawn areas , plantings , irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion, replacement, or correction.
  2. Complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Owner.
  3. Final Acceptance will be based upon Engineer and Owner approval and the work having:
    - a. Uniform finished grades conforming to the drawings and free of erosion.
    - b. All maintenance items completed and documented by Contractor through maintenance report forms.
    - c. Satisfactory Seeded Lawn: At end of warranty and maintenance period, a healthy, uniform well-rooted, even-colored, close stand of grass has been established, free of weeds, disease and insect problems, and surface irregularities, with 100 percent coverage of the specified species.
    - d. Satisfactory Sodded Lawn: At end of warranty and maintenance period, a healthy, well-rooted, even-colored, viable lawn, free of weeds, disease and insect problems, open gaps, bare or dead areas, and surface irregularities.
  4. Areas which do not meet the contract requirements shall be regraded as needed and seeded , mulched, and sodded,. Use specified materials and procedures to reestablish lawn that does not comply with requirements and continue maintenance at no cost to the Owner until lawn is satisfactory.
- C. Final Acceptance and the end of the warranty period for the lawns will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.Warranty and Maintenance Period:
- a. The end of the warranty and maintenance period shall beOne year following fall Substantial Completion.
  2. When the initial warranty and maintenance period has not elapsed before end of growing season October 31, or if lawns are not fully established, continue maintenance during next growing season until all maintenance and warranty obligations have been met.
  3. If, in the opinion of the Engineer, it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper execution of the installation and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

## PART 2 - PRODUCTS

### 2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Other varieties that those specified may be submitted for approval to Engineer, but they must be newer, more improved cultivars than what is listed.
- C. Dormant seeding shall only be permitted if approved by [Engineer] in writing. Apply seed at a rate that is 25 percent higher than the rates specified below.
- D. Seed Species:
  - 1. Quality: Seed of grass species as listed below for solar exposure, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.3 percent weed seed:
  - 2. Lawn Seed Mix: Proportioned by weight as follows:
    - a. 60 percent Kentucky bluegrass (*Poa pratensis*), a minimum of two improved turf type varieties.
    - b. 30 percent fine fescue (*Festuca*), a minimum two varieties; chewing and creeping red.
    - c. 10 percent perennial ryegrass (*Lolium perenne*).
    - d. Install at a rate of 4 pounds Pure Live Seed (PLS) per 1000 square feet of bed.
  - 3. Low-Mow Seed Mix: Proportioned by weight as follows:
    - a. 40 percent chewing fescue (*Festuca r. commutata*).
    - b. 30 percent creeping red fescue (*Festuca r. rubra*).
    - c. 20 percent hard fescue (*Festuca longifolia*).
    - d. 10 percent sheep fescue (*Festuca ovina*).
    - e. Install at a rate of 8 pounds Pure Live Seed (PLS) per 1000 square feet of bed.

### 2.2 SOD LAWN

- A. Provide an approved nursery grown, Number 1 Quality/Premium sod, complying with specifications for Turfgrass Sod Materials in TPIs guideline Specifications to Turfgrass Sodding. Furnish sod comprised of the specified species and of uniform density, color, and texture, strongly rooted, weed free and capable of vigorous growth and development once installed. Sod shall be 2 years old and shall have been grown at a sod nursery in a mineral-based root zone. Sod grown on peat (organic soil) will not be approved. Sod shall be free of objectionable grassy and broad leaf weeds.
  - 1. Thickness and width of sod shall be kept to strict dimensions, with width being 24" and containing 90-degree angle cut edges. Thatch shall be less than or equal to 1/2" thick. Netting associated with harvest must be removed before installation.
- B. Sun and Partial Shade: Proportioned by weight as follows:
  - 1. 60 percent Kentucky bluegrass (*Poa pratensis*), a minimum of three improved turf type varieties.
  - 2. 40 percent chewing red fescue (*Festuca rubra* variety) a minimum of two varieties.
- C. Sod Stakes: Sod stakes must be used on slopes 3:1 and steeper. Sod stakes shall be natural based plastic that is 100 percent biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer spacing and installation instructions.

### 2.3 STRAW MULCH

- A. Straw Mulch: Provide stalks from oats, wheat, rye, barley or rice that are free of weeds, air-dry, clean, mildew- and seed-free, threshed straw of wheat, rye, oats, or barley.
- B. Straw shall be in an air-dry condition and suitable for placing with commercial mulch blowing equipment.
- C. Tackifier:
  - 1. Hydraulically applied tackifier shall be an organic based or anionic polymeric emulsion blend designed for use over long-fibered mulch (straw). Tackifier shall:
    - a. Be powder or liquid based
    - b. Achieve a drying time between 12 and 18 hours
    - c. Minimum 4-month longevity after application
  - 2. Asphalt Emulsion tackifier is not permitted.

### 2.4 EROSION CONTROL BLANKET

- A. Erosion Control Blanket - Type 1: Intended for use on flat surfaces or slopes 4:1 (H:V) or greater where only sheet flow will be encountered.
  - 1. Straw/jute blanket shall be constructed with a 100 percent agricultural straw matrix (0.5 lbs. per square yard), with jute or cotton netting on top and bottom, sown together with biodegradable cloth thread. The blanket shall be 100 percent biodegradable and have a typical functional longevity of 12 months after installation. Plastic netting will not be permitted.
- B. Erosion Control Blanket - Type 2: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 8 feet per second (fps).
  - 1. Straw/coconut fiber blanket shall be constructed with 70 percent agricultural straw (0.35 lbs. per square yard), and 30 percent coconut (coir) fiber matrix (0.15 lbs. per square yard), with 100 percent woven jute netting on the top and bottom, sown together with biodegradable cloth thread. The Blanket shall be 100 percent biodegradable and have a typical functional longevity of 18 months after installation. Plastic netting will not be permitted.
- C. Erosion Control Blanket - Type 3: Intended for use on slopes 4:1 (H:V) or greater or in drainage swales with velocities up to 10 feet per second (fps).
  - 1. Coconut fiber blanket shall be constructed with 100 percent coconut (coir) fiber matrix (0.50 lbs. per square yard), with 100 percent woven coir fiber netting on top and 100 percent woven jute netting on the bottom, sown together with biodegradable cloth thread. The Blanket shall be 100 percent biodegradable and have a typical functional longevity of 24 months after installation. Plastic netting will not be permitted.
- D. Fasteners: Fasteners shall be natural based plastic that is 100 percent biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer's spacing and installation instructions.

### 2.5 EQUIPMENT

- A. Tiller:
  - 1. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 2:1 (H:V): A minimum D-7 size tractor with a mounted ripper consisting of 3 to 5 tines spaced a maximum 24 inches apart. Tines shall be equipped with 12-inch-wide winged ripper points and shall be capable of penetrating subsoils up to 24 inches deep in one pass.

2. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 4:1 (H:V): A tractor mounted disk harrow consisting of 6 12 offset disks weighing a minimum 1,800 pounds each. The harrow shall be capable of penetrating subsoils up to 18 inches deep in one pass.
  - B. Fine Grading: Hand rake, tractor mounted yoke rake or other similar equipment.
  - C. Hydroseed: A truck-mounted, hydraulically driven variable speed agitation seeder that effectively shoots an aqueous mixture of seed, fertilizer, and mulch over broad areas through a discharge boom and hydraulic hose. Minimum tank capacity shall be 1,000 gallons.
  - D. Hydraulic mulcher: See Hydroseeder.
  - E. Drop Spreader with Cultipacker, as manufactured by Brillion or John Deere or equivalent.
  - F. Broadcast Seeding: A spinning-disc type broadcaster with a calibration gauge (handheld and tractor mounted) shall be used to broadcast the seed over the designated areas.
  - G. Seed Imprinting Equipment: Used with spinning-disc type broadcaster to lightly cover or press seed into the soil. A tractor or all-terrain vehicle mounted dragging device consisting of anchor chains, disk chains, cables, chain harrow or other similar equipment.
  - H. Straw Mulcher: A power mulcher that thrashes and separates, then evenly distributes the straw at a capacity between 2 and 20 tons per hour, with a discharge distance between 35 and 100 feet in still air.
  - I. Crimping Device: A mulch disc or other mechanical anchoring/crimping device for use in anchoring straw mulch into place, such as a Reinco Model MD-96 or equivalent, having flat discs with notched edges spaced 8" apart to impress mulch 1-3" down into soil.
- 2.6 WATER
- A. Water for lawns shall be available from off-site sources.
  - B. Water shall be free of wastewater effluent or other hazardous chemicals.
- 2.7 TOPSOIL
- A. Refer to Section 329100 Soil Preparation (Topsoil) and Section 311000 Site Clearing.
- 2.8 FERTILIZER
- A. Fertilizer shall be a complete fertilizer of neutral character, consisting of fast and slow-release nitrogen and shall be applied at the rates and formulations that release nutrients when new plants can effectively draw them from the soil.
    1. The percentages of slow release and fast release nitrogen shall be adjusted based on the time of year fertilizers are being applied.
    2. For fall seeding, the percentage of slow-release nitrogen shall be higher than spring seeding since a high percentage of fast-release nitrogen will be mostly lost by runoff or infiltration before plant uptake.
  - B. Composition: The percentages by weight shall be determined per recommendations of the soil testing reports for lawns.



## 2.9 PESTICIDES AND HERBICIDES

- A. General: Pesticide and herbicides shall be registered and approved by the 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 and herbicides unless authorized in writing by authorities having jurisdiction.
1. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within seeded areas at the soil level.
  2. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.
  3. Broadleaf Herbicide (Selective and Nonselective): A post-emergent herbicide effective for controlling annual and perennial broadleaf weeds within turf grasses.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. A. General:
1. The Contractor shall establish a quantifiable system to be employed in the field for measuring areas, weighing products and calibrating equipment on a daily basis to ensure all products are installed at the specified rates of application.
  2. Prior to beginning work, examine and verify the acceptability of the project site and notify the Engineer of unsatisfactory conditions or obstructions that do not appear on drawings. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
  3. Identify areas of subsoil compaction prior to placement of topsoil.
  4. Verify that no foreign or deleterious material has been deposited in soil within a planting area.
  5. Where lawn installation occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during installation operations to their original condition.
  6. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  7. 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.
  8. Uniformly moisten excessively dry soil that is not workable, and which is too dusty.
  9. If lawn areas die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.
- B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.
- C. Coordination with Other Work:
1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.
  2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.
  3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

### 3.2 SUBGRADE PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by lawn installation operations.

- B. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.
- C. Vegetation Removal: Strip and dispose of organic debris and root mat.
- D. Topsoil stripping, stockpiling: Refer to Section 311000 - Site Clearing.
- E. Maintain subgrade in areas to be topsoiled in a uniform condition so as to prevent future depressions. Prior to placing topsoil;
  - 1. Till all subsoils to a minimum depth of 12-inches with approved equipment to remove all compacted subsoils. Tilling shall be complete, thoroughly fracturing subsoil. Perform tilling in two directions, one perpendicular to the other.
  - 2. Upon completion of tilling, the subsoils will require light compaction and leveling to prevent ponding of water and settlement after topsoil placement. As a final operation, a lightweight tracked dozer shall be employed that will remove surface irregularities and prevent excessive settlement. During this procedure, the surface of the subsoil on slopes greater than 4:1 (H:V) shall be imprinted with tracks from the dozer. Imprinting shall be perpendicular to the slope and shall be approximately one inch deep.
  - 3. Do not proceed with topsoil placement until subgrade tilling and imprinting is completed to the satisfaction of the Engineer.
  - 4. Repair disturbances to previously graded areas and remove surplus subgrade material associated with any landscape construction.
- F. If the prepared subgrade is eroded or compacted by rainfall prior to topsoil placement, rework the surface as specified.
- G. In locations where existing topsoil has not been removed, till entire area in accordance with 3.2 E above. Do not till within dripline of existing trees.

### 3.3 PLACING TOPSOIL, SOIL AMENDMENTS AND FERTILIZER

- A. Provide and fertilize topsoil in accordance with testing laboratory recommendations specified under Section 329113 "Soil Preparation (Topsoil)".
- B. Uniformly distribute topsoil on sod areas so that after light compaction and finish grading, a uniform depth of 6-inches is achieved. Reduce elevation of planting soil to allow for thickness of sod. Placement shall include spreading, cultivating, lightly compacting, dragging and grading to the conditions specified below.
- C. Uniformly distribute topsoil on low-mow seeding areas so that after light compaction and finish grading, a uniform depth of 4 inches is achieved. Placement shall include spreading, cultivating, lightly compacting, dragging, and grading to the conditions specified below.
- D. Topsoil, when placed, shall be dry enough so as not to puddle or bond. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to proper grading or lawn operation.
- E. Following topsoil placement but prior to finish grading, broadcast all soil amendments and fertilizer and rototill into the topsoil. The coverage areas for soil amendments and fertilizer shall be carefully calculated by the installer and fully blended into the entire topsoil profile. Do not incorporate soil amendments and fertilizer more than 5 days in advance of seeding.

### 3.4 PRE-INSTALLATION PREPARATION

- A. Finish Grading:
1. Immediately before lawn installation scarify, loosen, float, and drag topsoil as necessary to bring it to the proper condition. Remove all foreign matter larger than 1" in diameter. There shall be no visible plants, roots, debris, or any foreign material present prior to installation.
  2. Finished grades shall slope to drain, be free of depressions or other irregularities, lightly compacted to prevent settlement, and shall be uniform in slope between grading controls and the elevations indicated.
  3. Finished grade for seeded lawn areas shall meet existing grades at contract limits and be ½" below top of curbs, walk paving, and metal edging if used.
  4. Finished grade for sodded areas shall meet existing grades at contract limits and be 1" below top of curbs, walk paving, and metal edging if used.
  5. Before lawn installation obtain Engineer's acceptance of finish grading. Restore seedbed areas if eroded or otherwise disturbed after finish grading.

### 3.5 SEEDING AND MULCHING

- A. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.
- B. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean seeding, dragging, mulching, crimping and tackifier.
- C. Seeding Procedures:
1. Do not sow seed when weather conditions are unfavorable, such as during drought or high winds.
  2. Perform seeding with only approved equipment. Do not broadcast or drop seed when wind velocity exceeds 10 mph.
  3. Sow the seed uniformly at rates specified under Part 2.1 of this section. For dormant seeding, increase seeding rates by 25 percent.
  4. Do not use wet seed or seed that is moldy or otherwise damaged.
  5. Do not seed against existing trees and limit extent of seed to outside edge of planting saucers, plant beds and other seed beds. Mulch within plant beds and tree saucers which are contaminated by overseeding shall be removed and replaced.
  6. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  7. Immediately following seeding, rake, drag or float all seed beds to provide a light covering of topsoil approximately 1/8 inch deep. When using equipment that lightly injects the seed into the soil, include equipment that lightly rolls the seed bed to provide good moisture contact between the seed and soil.
  8. Maintain soil moisture in accordance with Part 3.11 below.
- D. Straw Mulching Procedures:
1. Do not use any straw that contains weeds and other plants that will contaminate the seed beds with unspecified plants. Carefully inspect each bale of straw prior to spreading and any bales observed to be contaminated with weeds shall be removed from the site on a daily basis.
  2. Do not mechanically blow straw when wind speeds exceed 10 mph.
  3. Remove all straw that has been deposited outside the limits of seeding and on adjacent pavement, plant beds and tree saucers.
  4. Spread straw mulch evenly at the rate of approximately 2 tons dry straw per acre. Place all mulch over all seeded areas within 24 hours after seeding. A mechanical blower or hand spreading shall be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Mulch shall be uniform in thickness and cover resulting in a blanket of straw approximately 1 ½ inches loose thickness with little to no visible soil.

5. Slopes 4:1 or steeper and drainage swales shall be stabilized with erosion control blanket in accordance with Part 3.12 below.
6. For dormant seeding, mulching shall be replaced with erosion control blanket in accordance with Part 3.12 below at no additional cost to the Owner.

E. Anchoring Straw Mulch Procedures:

1. Anchor the mulch by using both an approved crimping device and applying tackifier on the mulched surface immediately following mulching operation.
2. Mulch shall be crimped in all seed beds where slopes are less than 4:1 (H:V) and of sufficient width to allow equipment to perform crimping without damaging the finish seed bed. Crimp all locations in two directions. When finished, straw shall be anchored one to two inches into the seed bed in rows no more than eight inches apart.
3. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.
4. Any seed and mulch displaced due to improper crimping and bonding with tackifier shall be immediately replaced to the specified condition at no addition cost to the Owner.

3.6 SODDING PROCEDURES

- A. Lay sod within 24 hours of harvesting. Do not lay sod if it is dormant or if ground is frozen.
- B. Correct all inequalities and soft spots in the sod bed before installation. Roll site with a 200-pound roller to firm the soil. Sod must be installed onto moist, smooth soil. Water thoroughly and allow surface to partially dry before installation. Do not create muddy soil or excessively moist condition that will result in rutting and disturbances to the finish grades. During installation, continue to fine grade areas immediately in advance of the work to maintain a smooth surface.
- C. Sod shall be entire pieces except where trimming is required at the ends of each row. No piece shall be less than 12-inches in any dimension.
- D. Lay sod to form a solid mass with joints staggered to prevent water from channelizing and eroding the sod bed. Butt ends and sides of sod rolls tightly together; do not overlap and do not stretch sod to make edges meet. Stagger rolls to offset joints in adjacent courses. There shall be no visible gaps between any adjacent piece of sod or at transitions between pavement, curbs and edging. The root zone of sod shall not be visible above curbs or sidewalks.
- E. Lay sod perpendicular to slopes, and peg sod on slopes exceeding 3:1 or steeper with two pegs per square yard. When sod may be displaced during installation (steep slopes), work from ladders or treaded planks installing pegs immediately after each piece is installed.
- F. Tamp or roll sod with a 200-pound roller immediately after it is laid to ensure full contact between the sod root mass and topsoil. The finished surface shall be true to grade and shall be smooth, even, and equally firm at all points.
- G. After the sod is completely installed, resod all areas which have browned out or fail to show a uniform stand of grass. Repair all visible cracks between pieces of sod.
- H. Maintain soil moisture in accordance with Part 3.11 below.

### 3.7 WATERING PROCEDURES

- A. Immediately following lawn installation water all bed areas thoroughly and immediately with a fine mist until soil is soaked to a depth of at least 2-inches or as indicated above. Puddling of water or allowing the seedbed to dry is unacceptable.
- B. For seeded areas, maintain soil in a moist condition (in hot dry weather irrigation may be required 2-4 times per day) until seeds have sprouted and reached a height of 1-inch. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering. Provide irrigation to moisten soil to a depth of 4" to encourage deeper rooting.
- C. For sodded areas, begin watering the entire area within 24 hours of installation and water daily for the first two weeks; twice a day in hot dry weather. Keep soil in all areas moist but not soaked to 2-inches below the bottoms of the plants. Water thereafter a minimum of once every 2-3 days unless natural rainfall has provided equivalent watering until Final Acceptance. During this period, moisten soil to a minimum depth of 4" to encourage deeper rooting.
- D. Watering at accelerated rates that dislodge seed and mulch materials, or cause erosion shall be immediately repaired at no cost to the Owner.

### 3.8 EROSION CONTROL BLANKET PROCEDURES

- A. Install erosion control blanket as indicated in on the Plans , in all drainage swales and all seed beds with slopes 5:1 (H:V) or steeper.
- B. Immediately following seeding, erosion control blanket shall be rolled out in place in the direction of the slope fall line. The material shall be applied without stretching and shall lie smoothly but loosely on the soil surface. Installers shall minimize walking directly on the seed or topsoil bed either before or after the blanket is applied.
- C. All ends shall be buried a minimum of 4 inches deep and the trench shall be firmly tamped after closing.
- D. In cases where roll ends join, the up-slope piece shall overlap the down-slope piece by at least 18 inches.
- E. Anchor edges prior to backfilling trench, all overlaps at 12-inch intervals, and the center of each panel on 3-foot intervals.
- F. The upslope ends of the blanket shall be buried a minimum of 6 inches deep and anchored at 12-inch intervals prior to backfilling trench.
- G. Reseed all disturbed edges immediately following erosion control blanket installation and work seed into blanket.

### 3.9 MAINTENANCE

- A. General: Maintain and establish lawn areas by watering, fertilizing, pest and weed control, litter removal, mowing, trimming, repairs, and performing other operations as required to establish healthy, viable lawn. Maintenance shall also include grade repair, seeding , sodding and all associated soil amendments and fertilizers.

- B. Provide all maintenance under the supervision of a skilled employee of the lawn installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conducting turf diagnostics to identify the presence of disease, insect and fertility problems, and directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified under Part 1.5.C of this section and thoroughly documented under the required Maintenance Report Forms to verify the work has been properly performed.
- C. Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor's expense.
- D. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each area is installed and continuing until Final Acceptance and the end of the warranty period. During this period, perform the following:
1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly. Check for over - or under-watering using visible turf symptoms and checking soil moisture. Adjust the irrigation schedule as needed. If turf is not appearing healthy or if foliage color is atypical, Contractor must determine the cause and resolve the condition ASAP.
  2. Prior to each mowing, collect all debris, litter and miscellaneous materials accumulating on the site and remove from the site.
  3. Irrigation: Irrigate all turf areas to maintain optimum moisture within the root zone as specified under Part 3.11 above. When using an automatic sprinkler system, the lawn installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
  4. Mow all lawns weekly during the growing season and as described below. Mowing frequencies shall be adjusted based on cutting requirements and may require more frequent visits during high growth periods. Use mulching mower only with sharpened blades and alternate direction of each mowing session to prevent rutting.
  5. Fertilize as described below.
    - a. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use Integrated Pest Management practices to minimize the use of chemical applications and reduce hazards. Apply herbicides and pesticides as described below.
  6. Remove leaves bi-weekly during the fall as they accumulate on the lawns. Bag and dispose off-site. Do not mow in advance of leaf removal.
  7. Repair bare, eroded or settled areas and restore to provide a uniformly smooth lawn with the specified grasses. Provide same materials and installation procedures as those used in the original installation.
  8. Reclaim/replace soil materials and turf damaged or lost in areas of subsidence. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
  9. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
- E. Mowing: Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowing. At the time of each mowing, adjust mowing equipment to meet this requirement. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the following grass height:
1. Mow kentucky bluegrass to a height of 2-1/2 to 3 1/2-inches.
  2. Mow turf-type tall fescue to a height of 3 to 4 inches. Athletic fields with tall fescue, mow to a height of 2 to 3 inches.
  3. Mow Low-Mow Fescue:

- a. For very low maintenance or natural lawns, mow during late spring to cut off flower heads. Mow to a height of 4-inches. Weed control during establishment to remove flowering annual and perennial weeds within the seedbed may require more frequent mowing as part of the weed control program and shall occur at no additional cost to the Owner. Mow in late fall to a height no less than 4-inches to reduce biomass for the following season.
- b. For a more traditional lawn, mow every month to a height of 3-1/2 to 4 inches.
4. For sodded lawns wait at least 2 weeks after installation for first mowing.
  - a. Mowing heights may increase during the hot summer months based on regional conditions.
  - b. Collect all grass clippings if mowing is not sufficiently timed to allow for composting into the existing lawn and accumulations of clippings can be observed on the surface of the grass. Collection and off-site disposal shall be performed at no additional cost to the Owner.

### 3.10 POST-INSTALLATION FERTILIZATION

- A. Apply fertilizers at the time of season, rate of application and grade of N-P-K that maximizes the health of the lawn and minimizes the potential run-off of fertilizers to adjacent waterways and groundwater. Avoid the use of phosphorus unless soil test results show that site soils are deficient of this nutrient.
- B. Test site topsoil in early spring and/or fall and base actual fertilizer rates on testing recommendations.

### 3.11 PESTICIDE APPLICATION

- A. Apply pesticides, and other chemical products and biological control agents according to 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.
  1. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.
  2. For broadleaf herbicide:
    - a. Not used
    - b. Apply during September in Zones 5 through 8
    - c. Do not apply herbicides that contain Dicamba as they can harm adjacent woody plants.
  3. Apply, only as necessary, pre-emergent herbicide during early spring to prevent crabgrass and other annual weeds.

### 3.12 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. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. 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.
- D. Protect newly seeded areas from stormwater flows discharging from paved surfaces until grass establishment. Additional water diversion and erosion control measures such as wattles and check dams may be utilized at Contractor's discretion and expense.
- E. Remove nondegradable erosion-control measures after grass establishment period.

City of Elgin  
Elgin Sports Complex Expansion -  
Phase 1

14106.002  
Issue For Bid  
Not For Construction

END OF SECTION



## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Tree and shrub plantings.
  2. Herbaceous perennials, ornamental grasses, groundcover and vine plantings.
  3. Plant procurement.
  4. Planting mixtures.
  5. Plant mulch.
  6. Metal edging.
  7. Staking and guying.
  8. Maintenance.
  9. Warranty replacements.
- B. Related Requirements:
1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
  2. Section 311000 "Site Clearing" for stripping on-site topsoil.
  3. Section 312000 "Earth Moving" for mass grading of the site.
  4. Section 328400 "Planting Irrigation" for turf and planting irrigation systems.
  5. Section 329100 "Soil Preparation (Topsoil)" for lawns and plant mixture amendment.
  6. Section 329200 "Lawns" for lawn seeding and sodding.
  7. Section 329600 "Transplanting" for transplanting non-nursery grown trees.

### 1.2 REFERENCES AND REGULATORY REQUIREMENTS

- A. Hortus Third, The Staff of the L.H. Bailey Hortorium. 1976. MacMillan Publishing Co., New York.
- B. ASTM International, as referenced herein as ASTM.
- C. American Standard for Nursery Stock, as referenced herein as ANSI Z60.1-2004.
- D. United State Department of Agriculture (USDA), Plant disease and insect control Phytosanitary and Export Certifications.
- E. United States Composting Council, Seal of Testing Assurance (STA), Procedures for sampling and testing as outlined in the Test Methods for the Examination of Composting and Compost (TMECC) protocols.

### 1.3 DEFINITIONS

- A. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Mycorrhizal Inoculum: Fungi either introduced or naturally occurring in the soil that greatly increased plant roots growth and ability to absorb nutrients and water.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Planting Area: Areas to be planted.
- H. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, annuals, perennials, bulbs, corms, tubers, or herbaceous vegetation.
- J. 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.
- K. Root Production Method (RPM): A trademark technology referred to as root production method for a variety of tree and shrub species resulting in a dense fibrous root system for small sized plants.
- L. Single Central Leader: A single central dominant leader branch, free of secondary co-dominant stems that would compete with the central leader, either naturally occurring or professionally trained in the nursery with no stem deformities or residual woody stubs from original leader.
- M. Specimen Plant: Exceptionally heavy, symmetrical, and tightly knit, growth, superior in form, with properly spaced branching.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- P. Sheared Evergreen: Any evergreen tree or shrub that has been heavily trimmed or pruned to remove the natural shape of the plant. An evergreen tree grown at a "Christmas" tree farm is typically sheared.
- Q. Young Plants: Lining out stock, seedlings generally sold within the wholesale trade for continued cultivation.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

- A. Product Data:
  - 1. Plant procurement verification:

- a. Within 4 weeks following the execution of the Agreement between the Owner and Contractor, submit vendor purchase order, invoice or bill of lading for each plant species showing sizes, quantities and root treatment.
  - b. Provide digital photos of all plants materials. Photos must depict the entire size and condition of the plant and include a scale rod or other measuring device to show scale. For species where more than 20 plants are required, include a minimum of three photos that show the average plant, the best quality plant, and the worst quality plant to be provided. Label each photograph with the plant name, plant size, and name of the growing nursery.
  - c. The Contractor may request the Engineer to provide nursery visits for the purpose of reviewing and tagging plant materials. The Contractor shall compensate the Engineer for said services.
  - d. Substitutions shall not be permitted without written approval from the Engineer.
  2. Metal edging and accessories.
  3. Tree wrap.
  4. Soil amendments: Provide information on composition and source of all soil amendments. Include test results for compost and peat.
  5. Mycorrhizal inoculum.
  6. Fertilizer.
  7. Pesticides and Herbicides: Include product label and manufacturer<sup>TM</sup>s application instructions specific to the project site.
  8. Antidesiccants: Include product label and manufacturers application instructions.
- B. Source Quality Control:
1. Samples:
    - a. Organic and Mineral Mulch: 1 quart by volume in sealed plastic bag labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
  2. Test Report:
    - a. Topsoil: Test reports including fertilization recommendations for lawns and plant materials. Refer to Section 329100-Soil Preparation (Topsoil).
  3. Certifications/Licenses:
    - a. Phytosanitary Certification: Plant material Inspection Certificates required by Federal, State or other governing authority at the time of plant material verification identified above.
    - b. License certificate(s) for pesticide applicator.
  4. Nursery Requirements:
    - a. Plants shipped to the site as B&B must originate from a licensed plant nursery with a current Phytosanitary certification... Field collected plants will not be permitted.
    - b. Plant digging shall comply with the following requirements:
      - 1) Digging shall not occur more than 4 months in advance of plant installation.
      - 2) Plants dug during the spring digging season must be planted in advance of the fall digging season of that same year.
      - 3) Plants dug during the fall season must be planted during the same season and will not be permitted for spring planting.
      - 4) No plants that have leafed out shall be dug.
      - 5) Plants with root systems that have grown through the original jute wrapping will not be permitted. This included all plants that have a second jute covering over the root ball.
      - 6) Jute wrapping that is heavily decayed or torn with exposed roots and loose root ball soil will not be permitted.
    - c. Wrap tree trunks with protective material in advance of digging.
- C. Field Quality Control:

1. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Engineer indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, planting and seeding areas of the site. For large site, the schedule shall reflect a phased installation and shall include support graphics required to identify this phased approach. Refer to 1.10 below for a complete list of schedule requirements.
2. Maintenance Schedule: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under 3.13 of this section. Coordinate landscape maintenance with other applicable Sections (Native Seeding , Lawns , Irrigation) and combine all maintenance activities into one plan of action. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.
3. Irrigation Plan: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plans shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and frequencies and winterization procedures. In locations where no automatic irrigation system has been installed, describe means, methods and frequencies for hand watering. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Engineer. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractors expense from a source approved by the Engineer. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive [and shall be the basis for monthly payment during the maintenance period].

#### 1.6 INFORMATIONAL SUBMITTALS

##### A. Qualification Data:

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
2. License certificates for arborist.

#### 1.7 QUALITY ASSURANCE

##### A. Qualifications:

1. The Contractor shall be a company specializing in exterior landscape , irrigation seeding installations and maintenance, having a minimum 5 years<sup>TM</sup> experience in projects of the scope and scale being specified.
2. Installers field technician: The installer shall provide a full-time supervisor on site when work is in progress.
3. Maintenance field technician: The maintenance activities for all landscape areas shall be performed by skilled employees of the landscape installer. Subcontractors specializing in landscape and turf maintenance will not be permitted unless approved in writing by the Engineer.
4. Pesticide applicator: State licensed, commercial.
5. Tree and shrub pruning: State licensed Arborist.

##### B. Substitutions:

1. It is the Contractors responsibility to locate and secure all plant materials and to verify their availability through the timely Action Submittal process identified above. Failure to comply with this requirement shall not be a reason for making substitutions. Furthermore, it may be necessary to purchase specified plants from multiple nurseries and from out-of-state sources providing said sources are within the same hardiness zone as the site.
  2. Substitutions of plant materials will not be permitted unless authorized in writing by the Engineer. If proof is submitted in writing that a plant specified is not obtainable, the Engineer may assist in identifying alternate sources or substitutions.
  3. Plants of larger size may be used if approved and if root balls meet ANSI Z60.1 standards for the increased size. Adjustments will be made at no additional cost to the Owner. Approval of smaller size plant materials shall require a corresponding of the contract price subject to owner approval.
  4. Container plants may be substituted for those designated "B&B" if approved by the Engineer.
- C. Measurements: Measure plants according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
  2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
  3. Plants pruned to compensate for transplanting shock will not be accepted if overall height and spread does not meet the specified dimensions after pruning.
- D. Plant Material Observation: Engineer may observe plant material either at place of growth or at site before, during or after planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Engineer retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. General:
1. Packaged Materials: Deliver packaged materials in original unopened containers showing weight, analysis and name of manufacturer. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.
  2. Store materials only in locations approved by the Owner.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Plant Materials:
1. During shipment, do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Do not bend, stack or bind plants in a manner that damages bark, breaks branches or root systems, deforms root balls or destroys natural shape.
  2. Transport plants in closed vehicles or with the entire load properly covered to protect from drying winds, heat, freezing or other exposure that may be harmful. Schedule shipping to minimize on-site storage of plants. Closed vehicles shall be adequately ventilated/refrigerated.

3. Stock shall not be shipped until the planting preparations have been completed. If planting is delayed more than 24 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.
  - a. Set balled stock on ground and cover ball with soil, or bark mulch.
  - b. Do not remove container-grown stock from containers before time of planting.
  - c. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.
4. Schedule shipping aquatic tubers and plugs to result in on-site storage time of less than one day prior to installation. If delays beyond the contractor's control occur after delivery, store plants to ensure viability. All aquatic plants that are in a state of decay at the time of planting shall be rejected regardless of its condition at the time of delivery to the site.
5. Labels: Prior to shipping, each plant or bundle of like variety and size shall be labeled with legible weatherproof tags indicating the correct name and size of plant. Label aquatic plants (tubers, plugs, and/or bare-root) individually or in bundles of like variety.
6. Aquatic plant container bags shall be opened upon arrival to allow air flow, but stored in a cool shaded location with ample moisture to maintain the plants in their natural wet habitat condition.
7. Store bulbs, corms, and tubers in a dry place at 60 – 65 degrees F until planting.
8. Handle plants at all times in accordance with the best horticultural practices. Lift B&B materials from the bottom of the ball only; do not roll the plants. Plants handled otherwise will be subject to rejection. Balled and burlapped plants which have cracked or broken balls are not acceptable and shall not be planted. Plants with mechanical damage, deformation or breakage will not be accepted and are to be replaced at the Contractor's expense.

#### 1.9 SCHEDULING

##### A. Work Schedule:

1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
  - a. Submittal schedule.
  - b. Tagging of plants in nurseries.
  - c. Delivery of other materials to the site.
  - d. Staking of plant locations on the site.
  - e. Delivery of plant material to the site.
  - f. Planting.
  - g. Substantial Completion of the work.
  - h. Maintenance period.
2. Update schedule monthly to reflect progress of the work.

##### B. Planting Season:

1. Materials shall be installed during planting seasons normally recognized in the job locality.
2. USDA Hardiness Zone 5:
  - a. B&B and container grown plants, planting season shall be from April 1 through June 1 and from October 1 until the prepared soil becomes frozen.
  - b. Evergreen plants from April 1 through June 1 and from September 15 through October 15.
  - c. Bare root woody plants and aquatic tuber and root stock only in spring from April 1 through approximately June 1 but no later than full leaf-out of existing woody and aquatic plants.
  - d. Bulbs, corms and tubers from September 15 through November 1 and from April 1 through June 1. Spring vs. fall planting is species dependent and Contractor shall comply with seasonal limitations identified on the plant list included on the drawings.
3. If special circumstances warrant installation outside the normal planting season, submit a written request to the Engineer describing conditions and stating the proposed variance. Planting outside the planting season could extend warranty obligations and will be dependent upon the extent of the variance.

4. Weather limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
5. Coordination with lawn installation: Plant trees, shrubs, and other plants after finish grades are established but before seeding/sodding unless otherwise indicated. When planting trees, shrubs, and other plants after seeding/sodding, protect completed areas, and promptly repair damage caused by planting operations.

#### 1.10 WARRANTY, MAINTENANCE AND ACCEPTANCE

##### A. Substantial Completion:

1. The Substantial Completion inspection shall occur for the entire project and only one Notice of Substantial Completion will be issued. Phased approvals will not be permitted. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion or correction.
2. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs and plant replacements shall occur at no additional cost to the Owner.
3. Substantial Completion will be provided for all planting areas complying with the following:
4. Engineer approval of all specified submittals.
5. The work shall be 100 percent complete (including all site preparation , earthwork , plant mixture installation , plantings , lawns , , irrigation, and clean-up), and ready for inspection.
6. After receiving a Notice of Substantial Completion warrant and maintain all plantings in accordance with 3.13 of this Section in a vigorous, well-kept condition until Final Acceptance.

##### B. Final Acceptance:

1. Prior to plant dormancy and the expiration of the warranty and maintenance period, the Engineer will conduct an inspection of all plantings lawns , irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be clear evidence through factual reporting by the contractor and field observations made by the Owner or Engineer that the specified maintenance has occurred. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion, replacement or correction.
2. The contractor shall complete all punch list items within 2 week of its issuance. All repairs and plant replacements shall occur at no additional cost to the Owner.
3. Final Acceptance will be based upon Engineer, and Owner approval and the work having:
  - a. Been well maintained with all landscape plantings in a healthy growing condition free of disease and insect problems.
  - b. All maintenance items completed and documented by Contractor through maintenance report forms.
4. Final Acceptance and the end of the warranty period for the landscape will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

##### C. Warranty and Maintenance Period:

1. The end of the warranty and maintenance period shall be:
  - a. October 31 – one year following fall Substantial Completion.
  - b. June 30 – one year following spring Substantial Completion.
2. Prior to and during the warranty and maintenance period, replace any plants that are damaged, dead, or, in the opinion of the Engineer, are unhealthy, or have lost more than 25 percent of their natural shape due to dead branches, excessive pruning or improper maintenance. Rejected plant materials shall be removed from the site immediately after being rejected and legally disposed off-site. Replacement plants shall be installed within 2 weeks following the inspection unless otherwise agreed to in writing by the Owner.

3. Only one replacement of any plant is required after Substantial Completion, except for losses due to failure to comply with specified installation and/or maintenance requirements.
4. Make replacements in accordance with the original specifications, plant list, and notes. Fully restore areas damaged by replacement operations to their original and specified condition.
5. The Contractor will not be held responsible for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 miles per hour, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.
6. If, in the opinion of the Engineer, it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper planting and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIALS

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in the Plant Legend shown on Drawings and with the minimum quality conforming to American Standard for Nursery Stock, ANSI Z60.1. Branching on all plants shall be characteristic of the species, well-shaped, full, sound, healthy, vigorous stock of uniform growth and densely foliated when in leaf. All plants shall be free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  1. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
  2. Plants shall originate from the same USDA Hardiness Zone as project site, or lower (colder).
  3. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Where plant height or spread is indicated with a tolerance, the smaller dimension is the minimum acceptable; the larger dimension represents the maximum permissible. The average dimension of all plants must, at least, equal the average of the tolerance figures shown on the drawings. Spread shall meet the minimum dimension specified in all directions and must be considered as pivoting on center of plant.
  4. Plants of a larger size may be used if acceptable to the Engineer and at no extra cost to Owner, with a proportionate increase in size of roots or balls.
  5. Canes on shrubs shall arise at or just below the root crown. Multi-stem and clump form trees shall have branches that arise at or just below the root crown except when approved by the Engineer.
  6. All plants shall have a waterproof legible label securely attached to each plant bearing designation of plants common and scientific name, including genus, species, and cultivar or variety, when applicable.
  7. Do not prune plants prior to delivery.
  8. Stressed or damaged plants or those not conforming to the specifications shall be subject to rejection by the Engineer at any time during the term of the contract.
- B. Root treatments on all plants shall conform to the following requirements:
  1. Balled and burlapped ("B&B") plants shall have a healthy root systems developed by transplanting or root pruning with a firm, natural ball of earth securely wrapped with burlap, bound with cord and wire basket. Root flare shall be visible before planting. Plants with damaged or broken root balls or multiple layers of burlap will not be accepted.
  2. Containers shall be finished landscape grade material having their roots well established in the soil mass. Plants over-established in the container, as evidenced by pot-bound root ends, will not be accepted.



3. Perennials , groundcover and ornamental grasses shall have well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery. [annuals and biennials shall be in bud but not yet in bloom].

- C. Trees: Evergreen and deciduous trees shall have straight single leaders. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will not be accepted. Evergreens shall be unsheared.

1. Trees indicated as specimen shall be exceptionally heavy, symmetrical, and superior in form, branching, and symmetry.
2. Caliper is the trunk diameter taken at a specified distance above root collar as described in ANSI Z60.1.
3. Branching height is the distance above ground where balanced branching occurs.

## 2.2 MULCH

- A. Organic Mulch: Well-composted, finely shredded processed hardwood bark, free from foreign material and fragments in excess of 2 inches in any dimension.

1. Dyed mulch or mulch that is predominantly wood chips will not be accepted.

## 2.3 TREE WRAP

- A. Tree wrap for deciduous trees shall be 4-inch wide, two-ply, waterproofed crepe Kraft paper with plies cemented together with asphalt. Twine used to secure wrap shall be natural fiber two-ply jute. Tape or plastic twine will not be permitted as a substitution for the jute twine.

## 2.4 WATER

- A. Water for lawns shall be available from on-site sources.
- B. Water shall be free of wastewater effluent or other hazardous chemicals. On-site sources of water may be available from the creek at no cost or from City hydrant with appropriate metering. Confirm prior to commencing work.

## 2.5 TOPSOIL

- A. Refer to Section 329100.

## 2.6 PLANTING MIXTURES

- A. General: All planting mixtures shall be blended materials, free of rocks, debris of any type, tree roots, and other extraneous materials that will impede plant growth.
- B. Standard planting backfill for individual tree and shrub pits shall be: 1 part existing, soil excavated from planting pit blended with 1 part topsoil and 1 part compost or peat.
- C. Plant bed mixture for shrubs beds shall be: 1 part existing, soil excavated from planting bed thoroughly blended with 1 part topsoil and 1 part compost or peat.
- D. Plant bed mixture for shrubs beds shall be: 2 parts topsoil thoroughly blended with 1 part compost or peat.
- E. Plant bed mixture for beds comprising a mix of shrubs, perennials, annuals, ornamental grasses and groundcover shall be 2 parts topsoil thoroughly blended with 1 part compost or peat.

- F. Engineered soil for bioswales shall be 2 parts topsoil thoroughly blended with 1 part compost and 1 part peat.

## 2.7 SOIL AMENDMENTS

- A. Peat shall be a product having at least 95 percent organic content consisting of sphagnum peat moss with a pH range of 3.0 – 4.0 and Von Post decomposition value of H1 – H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 – H6. Product shall be free of sticks, wood or other debris.
- B. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species).
  - 1. pH: 5.5 to 8.
  - 2. Moisture content: 35 to 55 percent by weight. No visible free water or dust is produced when handling it.
  - 3. Sieve analysis: 100 percent passing ¾ inch screen.
  - 4. Soluble salt content: Less than 5 percent.
  - 5. Organic matter content: Minimum 60 percent.
- C. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.
- D. pH Adjusters:
  - 1. Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85 percent calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
  - 2. Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

## 2.8 FERTILIZER

- A. Fertilizers are required at the time of installation and during the warranty/maintenance period. The fertilization program shall be based on soil testing and formulations and rates of application shall be based on test reports provided by the independent testing laboratory.
- B. The independent testing laboratory shall also prepare a custom formulation and rate for each category of plants to be installed and maintained; i.e. trees, shrubs, perennials/ornamental grasses, annuals and bulbs.
- C. Fertilizers shall include organic and inorganic, slow release and water-soluble nitrogen and the percentages shall be based on soil types and the time of year being applied. Fertilizers shall not be applied during the hot summer months unless specific to blooming plants or in the late summer when plant growth will not harden off prior to the first killing frost.
- D. The fertilizer to be used to amend the soil before planting shall be granular fertilizer that conforms to applicable state and federal regulations, and contains no less than 60 percent slow-release nitrogen.
- E. Fertilizer to be used during the year warranty maintenance period shall be a complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, not less than 30 percent of the nitrogen from a slow release source. Fifty percent of the nitrogen shall be derived from natural organic sources.

## 2.9 PESTICIDES AND HERBICIDES

- A. Pesticides and herbicides shall be registered and approved by the 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-use pesticides and herbicides unless authorized in writing by authorities having jurisdiction.
1. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
  2. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

## 2.10 ANTIDESICCANTS

- A. Water-soluble emulsion specifically manufactured for agricultural use that will provide a protective film over plant surfaces and be permeable enough to permit transpiration. Use according to manufacturer's written instructions.

## 2.11 METAL EDGING

- A. Metal edging shall comply with ASTM A1011/A1011M, sized 3/16 inch thick x 4 inches wide x 16 feet length, made of steel, colored black, fabricated in sections with stake pockets stamped, punched, or welded to face of sections approximately 30 inches apart, with 3/16 inch x 16 inch stakes, as manufactured by J.D. Russell Co., or approved equal.
1. Accessories shall be from same product line and manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. General:
1. Prior to beginning work, examine and verify the acceptability of the project site and notify the Engineer of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
  2. Verify that no foreign or deleterious material has been deposited in soil within a planting area.
  3. Where planting occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during planting operations to their original condition.
  4. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  5. Suspend spoil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  6. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
  7. If plants die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.
- B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.
- C. On-site sources of water will not be available for use by the landscape installer.
- D. Pesticides and Other Chemicals:
1. General: All plants delivered to the site shall be free of disease, pests, eggs, and larvae. Promptly remove all plants that do not conform to this requirement.

- a. Insecticides should only be used to control pests when present in quantities that will be detrimental to plant vigor.
  - b. Applying foliar herbicides to control weeds in plant beds after installation will not be permitted unless approved in advance by the Engineer. Approval will only be granted if plants to be controlled cannot be effectively removed by hand pulling. Foliar herbiciding will only be permitted as part of the weed control program developed by the Contractor in advance of planting.
  - c. All chemical shall be stored and mixed off-site. No chemicals of any type shall remain on site at the end of each work day.
  - d. Do not apply over water or dispose of used container on-site.
  - e. Post all pesticide and herbicide applications.
2. Pre-emergent application:
- a. Apply granular chemicals in accordance with Manufacturer's instruction.
  - b. Apply in early spring just prior to targeted species breaking dormancy. Do not apply too early in the spring.
  - c. Do not apply when weather conditions will prevent an effective application or will result in in-effective control of targeted species.
  - d. Spread granular chemical only in areas intended to be treated. Promptly remove all granular material spread over pavement and in areas not intended to be treated.
3. Post-emergent application :
- a. Protect all landscape plantings outside of target areas.
  - b. Mixing, cleaning or disposal of pesticides, herbicides, and other chemicals will not be permitted on site. Notify the Owner at least 24 hours prior to any application.
  - c. Do not spray chemicals when wind exceeds 5 MPH.
  - d. Repeat procedures until desired effect is achieved.
  - e. Mixing, application and clean-up procedures shall be in accordance with manufacturer's instructions.
- E. Coordination with Other Work:
1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.
  2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.
  3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.
- C. Vegetation Removal: Strip and dispose of organic debris and root mat.

### 3.3 LAYOUT

- A. Accurately lay out each plant location and planting bed edges according to the drawings, using clearly visible painted, labeled stakes or plastic flags. Spray paint continuous lines on bare soil delineating plant bed boundaries. When scaling locations on the drawings, use at least 2 known reference points as layout controls to determine plant locations. Do not proceed with planting operations until locations have been reviewed and approved in writing by the Engineer.

- B. Prior to installation, all plant locations and bed edges must be approved by the Engineer, who may field adjust locations at no additional cost to Owner. Plants installed without layout approval are subject to relocation by the Contractor at their expense.

### 3.4 PLANT INSTALLATION

- A. General: Complete all plantings, metal edging and mulching prior to fine grading adjacent seed beds.
1. For plant beds, complete rough grading.
- B. Planting Pit Excavation:
1. For individual plant pits in seeded areas, spread seed bed topsoil to the uniform depth and rough grade prior to layout and planting pit excavation.
  2. Remove rocks and other unclassified underground obstructions to at least 6 inches below the finished planting depth of the root ball. Trim perimeter of planting pit leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Ensure that root ball will sit on undisturbed base soil to prevent settling. If plant pits are initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  3. If underground utilities or other surface or subsurface obstructions are encountered that cannot be removed, do not proceed with planting operations until alternate planting locations have been selected and approved by the Engineer.
  4. Size and configure planting pits in accordance with the planting details. If rotating augers or other mechanical diggers are used, scarify the side walls and bottom of the pit.
  5. Where poor soil percolation is probable, test drainage by filling planting pits with 12 inches of water. Record the drainage time for each pit and if, in the opinion of the Engineer, the water does not adequately drain off within 24 hours, install drains or raise plant pits as directed.
  6. Keep excavations covered or otherwise protected after working hours and when unattended by Installer's personnel.
- C. Planting Bed Excavation:
1. Refer to Section 311000 – Site Clearing for vegetation removal and topsoil salvage for reuse in plant mixture.
  2. Refer to Section 312000 – Earth Moving for earthwork requirements.
  3. In locations where plant beds are shown on the drawings and earth moving is not required other than achieving the specified plant bed subgrades, excavate plant beds to the depth shown on the planting details. Remove all existing vegetation as described under 3.2C above. Following vegetation removal, strip existing topsoil and stockpile for testing and mixing with specified off-site topsoil and peat/compost. Remove surplus excavated subsoil material that is not part of the specified planting soil, remove all existing vegetation as described under 3.2C above. Following vegetation removal, top dress plant bed with four inches plant bed mixture and rototill into upper twelves inches of soil.
  4. Grade subgrade smooth and uniform. Slope to perimeter of plant bed when underdrains are required to collect accumulated water within the bed.
  5. Transition from plant bed subgrade to adjacent seed bed subgrade outside the limits of the plant bed to ensure full depth plant bed mixture is provided.
  6. Where plant beds terminate next to pavement surfaces, subgrade transitions shall be 12 inches wide within the plant bed to protect pavement base material from being undermined.
  7. Obtain approval from the Engineer for all subgrades prior to placing plant mixtures. Notify the Engineer at least 48 hours in advance of placing plant mixture.
  8. Keep excavations covered or otherwise protected after working hours and when unattended by Installer's personnel.
- D. Mixing and Placing Planting Mixtures:

1. Install planting bed and planting pit mixtures to the specified proportions and depths. On-site mixing of existing topsoil with off-site materials shall result in a homogenous blend of all ingredients. Screen all mixture to remove foreign debris and rocks greater than ½ inch diameter prior to placement.
2. Place planting bed mixture in 6 inch lifts and lightly compact to prevent settlement after planting. Settlement that occurs after planting will require plant removal and the addition of additional plant mixture at the Contractor's expense. When placing mixture in raised planters, set finish grade elevations 2 inches low for mulch placement.
3. Grade planting areas to a smooth, uniform surface plane. Roll and rake, remove ridges, and fill depressions to meet grade.
4. Before planting, obtain Engineer's approval of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

E. Fertilizing:

1. Prior to or during planting, amend all planting pit and bed mixes by incorporating fertilizer at rates specified by soil test reports as specified under Section 329100 – Soil Preparation (Topsoil). Do not broadcast fertilize over the surface of the soil or onto any plant root ball.
2. For individual plant pits, incorporate fertilizer into back fill during planting operations. For plant beds, pre-mix fertilizer prior to installation.

F. Planting and Backfill:

1. Do not plant when the ground is frozen or saturated.
2. Balled and burlapped plants: Do not use planting stock if root ball is cracked or broken before or during planting operation. Set the plant in the center of planting pit with the crown set between 1 inch above adjacent soil for shrubs and 2 inches above adjacent soil for trees. Plant root flares shall not be set below adjacent finish grade. Face plant to give the best appearance or relationship to primary views. Cut away burlap, rope, wire or other wrapping materials from the top one-third of the root ball, and remove from pit. If plastic wrap or other non-degradable materials are used in lieu of burlap, completely remove them from the root ball before backfilling. Backfill planting pit approximately two-thirds full, add fertilizer, water and allow planting mixture to settle. After the water has been absorbed, complete backfilling and tamp lightly to grade to prevent future settlement, and form a watering basin with plant mixture of the size indicated on Plans.
3. Container-grown plants: Remove containers and make at least five vertical cuts one-half to one inch deep around the root ball and thoroughly loosen the roots on the outside of the ball. Plant as specified above for balled and burlapped plants, and as modified herein. All container-grown stock shall be planted so that top of container soil is level with surrounding grade. Do not plant higher to account for mulch, as mulch should not cover plant crown.

3.5 SPECIAL PLANTING CONSIDERATIONS:

A. Mycorrhizal Inoculum:

1. Rototill 2 granular pounds per 1000 square feet into the top 8 inches of soil for plant beds or as recommended by supplier. Incorporate 1 pound per cubic yard of plant pit backfill as backfill is being placed.

B. Sloped Plantings:

1. 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. Complete planting as specified under 3.4 F above.

C. Jute Mesh:

1. On sloped plantings requiring jute mesh, immediately following placement of plant mixture cover the entire bed area before plant pit excavation and installation of plants. Excavate plant pits and insert plants through mesh by separating the fibers or cutting slits into the fabric, taking care not to destroy the integrity of the mesh as a whole. To minimize the disturbance of the mesh when planting, work from long, lightweight ladders or planks laid parallel to the slope.
  - D. Root Production Method (RPM) Trees:
    1. Complete plantings as specified for container grown plants above. Install tree guard and staking in accordance with planting detail.
  - E. Bare-Root Plants:
    1. Prior to planting, remove damaged roots and those running beyond the general root mass. Place bare-root stock in center of plant pit and plant so that the roots are arranged in a natural position, uniformly distributed around the crown of the plant. Carefully work soil mix in around the roots in several layers, watering until puddled and allowing the soil to settle between layers. Maintain plumb while working backfill around roots. Complete planting as specified for balled and burlapped plants above.
  - F. Mechanized Tree Spade Planting
    1. 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 Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
    2. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
    3. Cut exposed roots cleanly during transplanting operations.
    4. Use the same tree spade to excavate the planting pit as was used to extract and transport the tree.
    5. Fill all voids between the planting pit and root ball with off-site topsoil tamping or watering soil in place until all voids are filled.
    6. Deep root water and fertilize immediately following installation.
    7. Where possible, orient the tree in the same direction as in its original location.
- 3.6 MULCHING
- A. Uniformly install mulch on all trees and shrub beds to depth shown on Plans within 48 hours of planting.
  - B. Keep mulch out of the crowns of shrubs and perennials, at least 3 inches from all tree trunks, and off sidewalks and roadways.
- 3.7 PRUNING
- A. After planting, prune trees and shrubs to remove all dead, dying, broken, or crossed limbs flush with the ground or main stem leaving no stubs. Do not prune to shape or to compensate for transplanting shock without prior approval from the Engineer. Retain natural form of the plant type. Prune using standard professional horticultural and arboricultural practices. Remove trimmings from the site.
  - B. Employ workers experienced in this type of work.
- 3.8 WRAPPING
- A. The trunks of deciduous trees shall be wrapped immediately after planting, but not before the condition of the trunks has been inspected and approved by the Engineer. Trim the margins of any abrasions or cuts with a sharp, sterile knife prior to applying wrap.

- B. Wrap trees beginning at the base and extending to the first branches in a spiral pattern with an overlap of half the width of the paper.
- C. Secure the wrapping at the top, bottom and at 18 inch maximum intervals with twine.

### 3.9 STAKING AND GUYING

- A. Install guying and staking as shown on the details immediately after planting.
- B. Remove and dispose of stakes and guys at the end of the warranty period.

### 3.10 EDGING

- A. Metal Edge:
  - 1. Install edging as detailed and at all locations shown on Plans, keeping the alignment smooth and continuous without visible deviation from the line or arc being set.

### 3.11 CLEANUP AND PROTECTION

- A. Remove excess and waste material daily. When planting has been completed, clear the site of all debris, stockpiles and materials.
- B. Repair any damage to existing landscape, paving or other such features as a result of work related to this contract to its original condition.
- C. Protect landscape work and materials from damage due to landscape operations, operations by other Contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

### 3.12 MAINTENANCE

- A. Provide all maintenance under the supervision of a skilled employee of the landscape installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conduct plant diagnostics to identify the presence of disease and insect problems, and be capable of directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified under 1.5 C of this section to verify the work has been properly performed.
- B. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each plant is installed and continuing until Final Acceptance and the end of the warranty period. Perform all work under the direct supervision of a technician trained to recognize and treat conditions affecting the establishment and growth of the plants and perform the following:
  - 1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
  - 2. Irrigation:
    - a. Irrigate all plants to maintain optimum moisture within the root zone. Reoccurring overly dry or wet conditions shall be grounds for rejection of plant material. When using an automatic sprinkler system, the landscape installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.



- b. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Engineer. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Engineer.
- c. The soil of the upland plug planting zones shall be kept moist to a depth of four-inches throughout the first growing season. The soils of the wetland plug/tuber and root stock planting zones shall be kept saturated throughout the first growing season. Irrigate the remainder of the plant material to maintain optimum moisture within the root zone (minimum once per week).
3. All pruning shall be performed by or under the supervision of a licensed arborist. Prune dead wood and broken limbs. Do not shear evergreens or any shrubs unless specifically required to be maintained as a sheared hedge. Maintain the natural shape of trees and shrubs.
4. Maintain stakes and guys taut and in the specified condition. Repair tree wraps if loose, torn or untied.
5. Maintain all plant beds and tree saucers weed free. Edge shrub and perennial beds and tree rings at least monthly during the growing season, keeping all tree rings to a uniform diameter. Hook mulch monthly and add mulch as needed.
6. Deadhead perennials and biennials as necessary during maintenance visits to extend blooming periods.
7. In spring – prior to the start of the growing season, cut all ornamental grasses, perennials and biennials flush with the ground and remove cuttings from the site.
8. Apply treatments as necessary to keep plants and planted areas free of insects, pests, and disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and herbicides. Treatments include utilizing physical and cultural controls.
9. All pesticides shall be applied by a licensed pesticide applicator. Apply pesticides and all other chemical products and biological control agents in accordance with the authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner at least 24 hours before each application is performed. No mixing or disposal of chemicals is allowed onsite.
10. Apply antidesiccant to upright conifers December through February, at least once per month. In locations subject to high wind or salt spray, install burlap windscreens around spreading conifers and broadleaf evergreens but do not allow burlap to touch evergreen plants.
11. Collect all litter and debris from plant beds and dispose off-site.
12. Fertilization:
  - a. Trees, shrubs and ornamental grasses: Fertilize once in the fall after the first hard freeze (usually October) but before the ground freezes; 1 pound of 4-1-2 (N-P-K) per 1,000 square feet of ground below the tree canopy or shrub bed.
  - b. Perennials: Fertilize twice, once in the early spring and again 8 weeks later with 1 pound of 5-10-5 (N-P-K) per 100 square feet.
  - c. Annuals and bulbs: For bed plantings, use high phosphorous granular fertilizer 10-20-10 (N-P-K) monthly during the growing season applied at a rate identify on the package label. For potted annuals, use high phosphorous water-soluble fertilizer 10-20-10 (N-P-K) every 2 weeks applied at a rate identified on the package label.
13. Remove dead and unacceptable plants as their condition becomes apparent.
14. At the end of the warranty period, but prior to Final Inspection, remove all guying, trunk wrap, watering saucers and top dress tree rings and beds 1 inch deep with the specified mulch product.

END OF SECTION

SECTION 329600 - S - TRANSPLANTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes transplanting non-nursery-grown trees by tree spade.
- B. Owner-Furnished Material: Relocate trees as indicated on drawings.
- C. Related Requirements:
  - 1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
  - 2. Section 329300 "Plants" for new trees from nursery-grown sources.

1.2 DEFINITIONS

- A. General: See definitions in ANSI A300 (Part 6) and in ANSI Z60.1 pertaining to field-grown trees, except as otherwise defined in this Section.
- B. Caliper: Diameter of a trunk as measured by a diameter tape at a height 6 inches above the root flare for trees up to, and including, 4-inch size at this height; and as measured at a height of 12 inches above the root flare for trees larger than 4-inch size.
- C. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches above the ground line.
- D. Root-Ball Depth: Measured from bottom of trunk flare to the bottom of root ball.
- E. Root-Ball Width: Measured horizontally across the root ball with an approximately circular form or the least dimension for non-round root balls, not necessarily centered on the tree trunk, but within tolerance according to ANSI Z60.1.
- F. Root Flare: Also called "trunk flare." The area at the base of the tree'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.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to transplanting work include, but are not limited to, the following:
    - a. Construction schedule. Verify availability of materials, personnel, equipment, and unimpeded access needed to make progress and avoid delays.
    - b. Tree and plant protection.
    - c. Tree maintenance.
    - d. Arborist's responsibilities.
    - e. Tree-Transplanting Program.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each of the following:

1. Weed-control barriers.
2. Proprietary Root-Ball-Stabilization Device: One unit.
3. Slow-Release Watering Device: One unit of each size required.

- C. Pruning Schedule: Written schedule prepared by arborist detailing scope and extent of pruning each tree in preparation for and subsequent to transplanting.
1. Species and size of plant.
  2. Location on site plan. Include unique identifier for each.
  3. Reason for pruning.
  4. Seasonal limitations on pruning.
  5. Preparatory Pruning: Time schedule and description of preparatory pruning to be performed.
    - a. Indicate time in months preceding the extraction of the tree.
    - b. Indicate diameter of root ball and depth of root pruning for each tree.
  6. Description of root and crown pruning during and subsequent to transplanting.
  7. Description of maintenance following pruning.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified tree-service firm and arborist.
- B. Certification: From arborist, certifying that transplanted trees have been protected during construction and that trees were promptly and properly treated and repaired when damaged.
- C. Maintenance Recommendations: From arborist, recommended procedures to be established by Owner for care and protection of trees after completing the Work.
1. Submit before completing the Work.
- D. Existing Conditions: Documentation of existing trees indicated to be transplanted, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
1. Use sufficiently detailed color photographs or video recordings. Color shall accurately depict hue condition of foliage and bark.
- E. Tree-Transplanting Program: Submit before work begins.
- F. Sample Warranties: For special warranties.
- G. Tree-maintenance reports.

#### 1.6 QUALITY ASSURANCE

- A. Tree-Service Firm Qualifications: An experienced landscaping contractor or tree-moving firm that has successfully completed transplanting work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
1. Arborist Qualifications: Certified Arborist as certified by ISA.
- B. Tree-Transplanting Program: Prepare a written plan by arborist for transplanting trees for the whole Project, including each phase or process, tree maintenance, and protection of surrounding materials during operations. Describe in detail the materials, methods, and equipment to be used for each phase of the transplanting work.
1. Include transplanting times appropriate for each species at the Project location unless otherwise indicated on Drawings or directed by arborist.
  2. Include site plans clearly marked to show tree-moving routes from extraction to planting locations. Indicate proposed equipment, weight, and turning radii.
  3. Show details of temporary protective barriers where needed.
  4. Include diagrams showing clearances to utility lines and other encumbrances along route.

5. Include care and maintenance provisions and eventual removal of tree stabilization.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
  1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or trees.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery with appropriate certificates.
- C. 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 in such a manner as to destroy their natural shape.
- D. Completely cover foliage when transporting trees while they are in foliage.
- E. Handle trees by root ball. Do not drop trees.
- F. Move trees after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after moving, set trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

#### 1.8 FIELD CONDITIONS

- A. Field Measurements: Verify final grade elevations and final locations of trees and construction contiguous with trees by field measurements before proceeding with transplanting work. Perform transplanting only after finish grades are established.
- B. Weather Limitations: Proceed with transplanting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Do not transplant during excessively wet or frozen conditions. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- C. Coordination with Turf Areas (Lawns): Perform transplanting before planting turf areas unless otherwise indicated.
  1. When transplanting after planting turf areas, protect turf areas, and promptly repair damage caused by transplanting operations.
- D. Coordination with Planting Beds: Perform transplanting before planting bedded areas unless otherwise indicated.
  1. When transplanting after planting bedded areas, protect bedding plants, and promptly repair damage caused by transplanting operations.

#### 1.9 WARRANTY

- A. Installer's Special Warranty: Tree-service firm agrees to repair or replace trees and related materials that fail within specified warranty period.
  1. Failures include, but are not limited to, the following:

- a. Death and unsatisfactory growth except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
  - b. Death and unsatisfactory growth is defined as more than 25 percent dead or in an unhealthy condition or failure to meet general performance requirements at end of warranty period.
  - c. Structural failures including trees falling or blowing over.
  - d. Faulty performance of materials and devices related to tree plantings including tree stabilization and watering devices.
2. Warranty Periods from Date of Transplanting Completion:
    - a. Trees: 12 months.
  3. Include the following remedial actions as a minimum:
    - a. Remove dead trees and trees with unsatisfactory growth at end of warranty period; replace when directed.
    - b. A limit of one replacement of each tree will be required except for losses or replacements due to failure to comply with requirements.
    - c. Replace materials and devices related to tree plantings.

#### 1.10 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Provide tree maintenance by skilled employees of tree-service firm and as required in Part 3. Begin maintenance immediately after trees are installed and continue until plantings are healthy and well established but for not less than maintenance period below.
  1. Maintenance Period: 12 months from date of transplanting completion.
- B. Continuing Maintenance Proposal: From tree-service firm to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Transplanted trees shall be healthy and resume vigorous growth within one year of transplanting without dieback due to defective extracting, handling, planting, maintenance, or other defects in the Work.

#### 2.2 PLANTING MATERIALS

- A. Backfill Soil: Excavated soil of suitable moisture content and granular texture for placing and compacting in planting pit around tree, and free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
  1. Mixture: Well-blended mix of two parts excavated soil to one part planting soil.
  2. Planting Soil: Planting soil as specified in Section 329100 "Soil Preparation."

#### 2.3 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
  1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood , free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
  2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood preservative treatment by pressure process.
  3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
  4. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.

5. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
6. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by tree stem; sized as indicated and according to manufacturer's written instructions.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Anchor Tie Down Systems, Inc; Twister Tie Down.
    - 2) Arborbrace; Arborbrace Tree Guying System.
    - 3) Deep Root Partners, L.P; ArborTie.
    - 4) J. R. Partners; Mega Stake, R2 Stake,.

B. Root-Ball-Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: Hot-dip galvanized or stainless steel.
3. Proprietary Root-Ball-Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball; sized according to manufacturer's written instructions unless otherwise indicated.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Border Concepts, Inc; Tomahawk Tree Stabilizers.
    - 2) Foresight Products, LLC; Duckbill Rootball Fixing System.
    - 3) Tree Staple, Inc; Tree Staples.

2.4 WATERING DEVICES

- A. Slow-Release Watering Device: Standard product manufactured for drip-irrigation of plants and emptying its water contents over a period of 2 to 9 hours; manufactured from UV-light stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Spectrum Products, Inc; Treegator (Original).
    - b. Turf Chemicals Plus, Inc; Tree Ring (Regular).

2.5 MISCELLANEOUS PRODUCTS

- A. Organic Mulch: Shredded hardwood as specified in Section 329300 "Plants."
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Pesticides: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended in writing 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.
1. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- E. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
1. Size: 10-gram tablets.

2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.
- F. Weed-Control Barriers:
1. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.
- G. Wood Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC4a, using preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross transplanting areas.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to transplanting work and tree protection and health.
- C. Proceed with transplanting only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, other facilities, turf areas, and other plants and planting areas from damage caused by transplanting operations.
- B. Utility Locator Service: Notify utility locator service for area where Project is located before beginning excavation.
- C. Locate and clearly identify trees for transplanting. Tie a 1-inch blue-vinyl tape around each tree at 54 inches above the ground.
- D. Apply antidesiccant to trees uniformly, using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during extracting, handling, and transportation.
  1. If deciduous trees are moved in full leaf, spray with antidesiccant before extracting and again two weeks after transplanting.

#### 3.3 PREPARATORY PRUNING

- A. Root Pruning: Perform preparatory root pruning under direction of arborist as far in advance of extracting each tree as the Project Schedule allows.
  1. Dig trench by hand or with tree spade around perimeter of tree at indicated root-ball width to the depth of the root system. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
  2. Root-Ball Width: Minimum 9 inches of root-ball diameter, or least dimension for non-round root balls, for each inch of tree caliper being transplanted.
  3. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking.
  4. Use narrow-tine spading forks to comb soil to expose roots with minimal damage to root system.
  5. Cut exposed roots manually with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

6. Do not paint or apply sealants on cut root ends.
7. Backfill trench with excavated soil.

B. Crown Pruning (Tip Pruning):

1. Perform preparatory crown pruning as directed by arborist. Follow procedures as specified in "Crown Pruning" Article.

3.4 EXCAVATING PLANTING PITS

A. General: Excavate under supervision of the arborist.

1. Excavate planting pits or trenches with sides sloping. 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. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as root ball.
3. Keep excavations covered or otherwise protected until replanting trees.

B. Subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Engineer if unexpected rock or obstructions detrimental to trees are encountered in excavations.

D. Seepage: Notify Engineer if subsoil conditions evidence unexpected water seepage into tree-planting pits.

E. Drainage: Fill planting pit or trench with 6 inches of water and time the infiltration rate of the soil. If the drainage rate is less than 0.25 inch per hour, notify Engineer to determine need for subsurface drainage.

3.5 EXTRACTING TREES

A. General: Extract trees under supervision of the arborist.

B. Orientation Marking: Mark the north side of each tree with non-permanent paint before extracting.

C. Root-Ball Width: Minimum 10 inches of root-ball diameter, or least dimension for non-round root balls, for each inch of tree caliper being transplanted.

D. Root-Ball Depth: As determined by the arborist for each species and size of tree and for site conditions at original and planting locations.

E. Digging:

1. Dig and clear a pit by hand or with tree spade to the depth of the root system. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Use narrow-tine spading forks to comb soil to expose roots with minimal damage to root system.
3. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking.
4. Cut exposed roots manually with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not paint or apply sealants on cut root ends.
5. Temporarily support and protect exposed roots from damage until they are permanently redirected and covered with soil. Cover roots with burlap and keep them moist until planted.

F. Extracting with Tree Spade: Use the same tree spade to extract the tree as will be used to transport and plant the tree.

1. Do not use tree spade to move trees larger than the manufacturer's maximum size recommendation for the tree spade being used.



2. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

### 3.6 PLANTING

- A. Planting Standard: Perform planting according to ANSI A300 (Part 6) unless otherwise indicated.
- B. Before planting, verify that root flare is visible at top of root ball. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- C. Ensure that root flare is visible after planting.
- D. Remove injured roots by cutting cleanly; do not break. Do not paint or apply sealants on cut root ends.
- E. Orientation: Position the tree so that its north side, marked before extracting, is facing north in its new location.
- F. Set tree plumb and in center of planting pit with top of root flare 2 inches above adjacent finish grades.
  1. Use specified backfill soil for backfill.
  2. If area under the tree was initially dug too deep, add backfill to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  3. After placing some backfill around root ball to stabilize plant, begin backfilling.
  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. Redirect exposed root ends downward in backfill areas where possible. Hand-expose roots as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
  6. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended by arborist. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
  7. Continue backfilling process. Water again after placing and tamping final layer of soil.
- G. Planting with Tree Spade: Use the same tree spade for planting as was used to extract and transport the tree. Do not use tree spade for trees larger than the manufacturer's maximum size recommendation for the tree spade being used.
- H. Slopes: When planting on slopes, set the tree 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.

### 3.7 CROWN PRUNING

- A. Prune to remove only broken, dying, or dead branches. Do not prune for shape.
  1. Do not remove or reduce living branches to compensate for root loss caused by cutting root system or to improve natural tree form.
  2. Pruning Standards: Perform pruning according to ANSI A300 (Part 1).
- B. Unless otherwise directed by arborist and acceptable to Engineer, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.

- E. Provide subsequent maintenance during Contract period as recommended by arborist.

### 3.8 MULCHING

- A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 12 inches and secure seams with galvanized pins.

### 3.9 INSTALLING SLOW-RELEASE WATERING DEVICE

- A. Provide one device for each tree.

### 3.10 TREE MAINTENANCE

- A. Perform tree maintenance as recommended by arborist. Maintain arborist observation of transplanting work.
- B. Maintain trees by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Treat as required to keep trees free of insects and disease.
- C. Fill areas of soil subsidence with backfill soil. Replenish mulch materials damaged or lost in areas of subsidence.
- D. Pesticide Application: Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written instructions. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
  1. Pre-Emergent Herbicides (Selective and Non-Selective): Apply in accordance with manufacturer's written instructions. Do not apply to seeded areas.
  2. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written instructions.

### 3.11 REPAIR AND REPLACEMENT

- A. General: Repair or replace transplanted trees and other plants indicated to remain or be relocated that are damaged by construction operations.

### 3.12 CLEANUP AND PROTECTION

- A. During transplanting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect trees from damage due to transplanting operations and operations of other contractors and trades. Maintain protection during transplanting and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After planting and before Substantial Completion, remove tags, markings, tie tape, labels, wire, burlap, and other debris from transplanted trees, planting areas, and Project site.

### 3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Except for materials indicated to be recycled, remove surplus soil, excess excavated material, waste materials, displaced plants, trash, and debris, and legally dispose of them off Owner's property.

- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
  - 1. Except for materials indicated to be retained on Owner's property or recycled, remove excess excavated material, waste materials, displaced plants, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 331100 - S - WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service fire-service mains combined water service and fire-service mains.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of City of Elgin General Notes and Standard Specifications for Water and Sewer Main Construction in Illinois including tapping of water mains and backflow prevention.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
  - 1. Notify Owner no fewer than four business days in advance of proposed interruption of service.

PART 2 - PRODUCTS

- 2.1 All pipes, valves, fittings, meters, hydrants, vaults and accessories shall meet the Regulatory Requirements.

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING

- A. Meet the requirements of the Regulatory Requirements.

END OF SECTION

SECTION 332200 - S - SEWAGE PUMPING STATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes a factory-built, packaged pumping stations with sewage pumps.

1.2 QUALITY ASSURANCE

- A. In order to establish a standard of quality, pump station equipment shall be supplied by Metropolitan Pump Company or a approved equal. To be considered an approved equal, complete details and shop drawings must be submitted to the engineer per Section 012500 - Substitution Procedures.
- B. The contractor shall prepare a bid on the basis of the specific equipment and materials specified.
- C. All controls, pumps, and motors shall be furnished by one equipment supplier. The equipment supplier shall have responsibility for the complete and proper operation of the new and existing pumping equipment, control equipment, and program as specified and furnished. The system supplier shall furnish 24-hour service for the complete system, and shall stock all parts used of the installation. Start-up services shall be included, and shall include operating instruction to the operators.

1.3 SUBMITTALS

- A. Shop Drawings
  - 1. The contractor shall submit a minimum of six (6) copies to the engineer for approval. Of these, two copies will be returned to the contractor with appropriate action taken.
  - 2. Each set of shop drawings shall include, but not necessarily be limited to:
    - a. Drawings showing dimensions of all equipment. Control details and electrical schematic diagrams. Performance data including, when applicable, pump curves, and motor data.
    - b. All other information necessary to enable the engineer to determine whether the proposed equipment meets the requirements.
- B. Installation and Operating Instructions
  - 1. Two (2) copies of a manual, containing installation instructions, operating instructions, wiring diagrams, parts list, and where applicable, test data and curves shall be provided.
  - 2. The contractor shall provide the services of factory-trained representative for a maximum period of one (1) day to start up the station and to instruct the owner's operating personnel in the operation and maintenance of the equipment provided.

1.4 WARRANTY

- A. The manufacturer shall warrant his product to be free from defects in workmanship for a period of one (1) year from date of completion.
- B. Warranties and guarantees by the suppliers of various components in lieu of a single source responsibility by the contractor shall not be accepted.
- C. In the event a component failure to perform as specified or is proven defective in service during the warranty period, excluding items of supply normally expended during operation, the manufacturer shall provide a replacement part without cost to the owner.

## PART 2 - PRODUCTS

### 2.1 SUMP BASIN

- A. The filament wound fiberglass shall have an inside diameter of 6 feet, 0 inches, and a 20 feet, 0 inches height as shown on the drawings. The basin shall have a steel, fiberglass coated, anti-floatation flange mounted on the bottom. Basin shall incorporate an outside valve vault of 6 feet, 0 inches in diameter by 6 feet, 6 inches in height as listed on the plans. The basin shall have an Aluminum cover encompassing both the wet well and the valve vault and provided with openings to bolt in the aluminum access hatches.

### 2.2 PIPING

- A. Piping in the basin shall be 4 inch ductile iron pipe and shall terminate with a flange outside the basin wall for connection to valves in an external valve vault. The valve vault shall include two 4" check valves with lever and spring and two 4" plug valves. Inlet or inlets into basin shall be grout sleeves for inlet pipes as indicated on the plans. The pump guide rails shall be 2.0" stainless steel pipe. Valve vault piping shall include a bypass connection with a riser pipe, 4" shut-off valve, and quick disconnect hose coupling for portable pump connection.

### 2.3 METAL-TO-METAL RAIL SYSTEM

- A. The MTM rail system shall include a discharge base elbow, sealing flange with rail guide, upper guide bracket, stainless steel lifting chain, and stainless steel guide rails.
- B. The discharge base elbow shall be mounted directly on the sump floor and sized according to the plans. It shall have a standard 125 lb flange, with machined face. The design shall be such that the pump to discharge connection is made without the need for any nuts, bolts, or gaskets.
- C. The base elbow shall also anchor two (2) 2.0" stainless steel guide rails.
- D. The sealing flange/rail guide bracket shall be mounted on each pump discharge. It shall have a machined mating flange, which matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by simple linear downward motion of the pump culminating with the entire weight of the pumping unit supported entirely by the base elbow. The upper guide bracket shall align and support the two guide rails at the top of the sump. It shall bolt directly to the hatch frame and incorporate an expandable rubber grommet.
- E. Each pump shall be provided with a stainless steel lifting chain, and be of sufficient length to extend from the pump to the top of the wet well. The access frame shall provide a hook to attach the chain when not in use. The lifting chain shall be sized according to the pump weight.

### 2.4 ACCESS FRAME AND COVER

- A. A double door access frame assembly for the wet well and a single access hatch for the valve vault shall be supplied. Access frame and covers shall be fabricated of aluminum and bolted to basin. Pump access frame shall support guide rails and electrical wiring bracket. A separate hinged cover shall be provided for each pump. Cover shall be provided with lifting handle and safety latch to hold cover in the open position. Locking hasps shall be furnished for each cover.

2.5 FALL-THROUGH PREVENTION SYSTEM (SAFETY GRATE)

- A. The wet well access openings shall be fitted with a permanently installed fall through prevention SAFETY GRATE for access to the opening below. The system shall be Hatch Safety Great as manufactured by USF Fabrication, Inc., or equal. The system shall consist of the following components:
1. Hatch Safety Grate rotates 90 degrees.
  2. Safety Grate designed for 300 p.s.f. loading.
  3. Hold Open Rods
  4. Aluminum Grate has an OSHA safety orange finish
  5. Hardware components are made of stainless steel to resist corrosion.

2.6 SUMP PUMP

- A. A sump pump shall be provided for dewatering the valve vault back to the wet well. The pump shall be Metropolitan Model SH30i with 1/3 hp, 1 phase, 60 hz, 115v motor designed for automatic operation through a piggy-back ION switch. The pump discharge shall be 1-1/2".

2.7 SUBMERSIBLE PUMPS

- A. Each pump shall be of the sealed submersible type Model No.S4NVX. Pump shall be capable of handling raw, unscreened sewage with recessed impellers to handle minimum of 3" diameter spheres. The impellers shall be of ductile iron construction, class 65 with an average Brinnell hardness rating of 200. Pump suction and discharge openings shall be no less than 3" diameter. Pump shall have two mechanical seals with oil chamber between the seals. Rotating seal faces shall be carbon and stationary seal faces to be ceramic. Pump motor shall be of the sealed submersible type with standard insulation for operation in high-dielectric oil to give better heat dissipation and longer bearing life. The motor stator shall be held in place with removable end ring so that it can be removed for repair without heating outer shell or using a press. Motor housing shall be filled with high-dielectric oil and no pressure balancing devices shall be used. The pump motor shaft shall be of 303 stainless steel. Pump shall be a standard production pump with attached rail guides and discharge sealing flange. All lifting loads will come on the guide supports and not on the pump or motor housing. A lifting chain and hook shall be supplied for each pump. Each pump motor will be provided with heat sensing units, which shall trip the starter if the motor overheats. Seal chamber shall be fitted with an electrode probe to detect water in the seal chamber and indicated by seal fail lights on the control panel.
- B. Pump motor cords shall be designed for flexibility and serviceability under hard usage conditions and meet the NEC requirements for sewage lift stations. The electrical system shall include ground fault protection in accordance with NEC and de-energize the circuit in the event of electrical integrity failure. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be fitted with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction. There shall be an additional epoxy compound potting area separating the motor housing from the cord cap assembly for added protection. The cord cap shall be capable of removing and disconnecting the motor connections for pump removal, repair or replacement without disturbing the motor. Pumps shall be provided with 50' of power and sensing cables.
- C. Each pump shall have a capacity of 100 GPM at a total head of 26' TDH when operating at 1750 r.p.m. Pump motor shall be 5 HP, 3 phase, 460 volts, 60 Hz. NOTE: Available power to be confirmed prior to order.



## 2.8 CONTROL PANEL CONSTRUCTION

- A. The control panel shall have a NEMA-3R wall mount or pole mounted type enclosure pad lockable dead front with inner door with main disconnect and inside sub panel to protect electrical equipment. The enclosure shall be constructed of stainless steel. A lock hasp shall be provided on the outside door. A circuit breaker shall be provided for protection on each pump including the valve vault sump pump. Each pump shall also come equipped with an IEC magnetic starter, including 3-leg overload protection. All of the pilot-devices, operators, interfaces and indicators shall be installed on the face of the inner door, to accommodate the operating personnel, as listed:
1. A door-interlocked main power disconnect-switch;
  2. An integral color touch-screen operator interface panel.
  3. A 3-position control-mode selector switch.
  4. A Hand-Off-Automatic selector switch for each pump.
  5. A Pump-Running indicator-light for each pump.
  6. A Seal-Failure indicator-light for each pump.
  7. A Motor-Over-Temperature indicator-light for each pump.
  8. An Elapsed-Time-Meter for each pump.
- B. A terminal strip shall be provided for connecting pump and control wires. The panel shall include a GFI convenience outlet. The PLC shall include a DC power supply with battery back-up. The enclosure shall be protected from condensation through the use of a pre-wired thermostatically-controlled 30-watt anti-condensation heater. The control components shall be mounted on a painted steel subpanel. Individual electrical components shall be mounted in accordance with the manufacturer's recommendations. Wiring within the enclosure shall be run through plastic wiring duct or tied and bundled to prevent strain and abrasion. All customer connections shall be wired to individually numbered terminals and wires shall be numbered at both ends for ease of trouble shooting. The control panel manufacturer shall be listed with underwriters laboratories under UL508 (type I) listing category for the manufacture of control equipment. The control panel shall contain UL listed components wherever practical. The entire control panel assembly shall be approved by UL and labeled to that effect.
- C. Furnish a Metropolitan LMS-II microprocessor based electronic Level-Management operational control system within the control panel. The level-management system shall be furnished as a complete factory assembled unit requiring only field installation and required electrical and sensor connections. The level-management system shall sequence the pumps automatically, in response to changing wet well levels. The control system shall be a complete automatic control package consisting of pump sequencing logic, operator interface terminal, and discreet operator controls. The system shall operate completely unattended, and shall provide annunciation of abnormal conditions. The entire assembly shall be completely pre-wired and function-tested at the factory prior to shipment.

- D. The LMS-II shall receive an analog signal proportional to the level in the wet-well and sequence the pumps as required in order to maintain the desired level set-point. The level management system shall provide totally automated sequencing of the pumps. The LMS-II shall be easily configured for pump-down applications. The analog input shall be provided for wet well level reference, via(1) submersible level-transducer, provided with cords which shall be 50-foot long, or longer if required by jobsite conditions. All cords must extend the entire distance from the transducers to the control panel terminals, without junction boxes or splices. The input signals shall be 0-5 vdc scalable or 4-20 mA. The transducers shall serve as the primary level-sensor and a float back up system shall serve as a fail-safe secondary unit. The transducer housing shall be 316 stainless-steel fitted with a stainless-steel cable support bracket. Liquid level shall be sensed by the deflection of a stainless-steel diaphragm having a displacement of less than 5 cu.mm from 0 to full scale. The atmospheric pressure side of the diaphragm shall be bonded to a silicon strain sensor coupled to an integral bridge circuit. Atmospheric venting shall be through the signal cable, directly to atmosphere. Transmitters requiring separate, sealed, expansion breathing systems shall not be accepted. Electrical connection shall be 2 wire, 4-20 mA, and shall be reverse polarity and surge protected. Accuracy shall be 0.6 percent of full scale. Full scale range shall be 0 to 14 feet (or as shown on the plans). Temperature compensated range shall be -20°F to 122°F., maximum operating temperature shall be -40°F to 176°F. The level-transducers shall be field-adjustable from above the wet-well, via the use of a chain & anchor system, consisting of a stainless-steel chain, stabilized by a cast-iron anchor, as shown on the drawings.
- E. The level management system shall alternate the lead pump after each cycle. The LMS-II shall alternate each available pump, as scheduled by the operator's preference. Pumps which are faulted or out of service shall automatically be omitted from the alternation scheme. The operator shall also be capable of manually selecting the lead pump.
- F. The wet well level shall be displayed on the controller's color touch-screen operator interface terminal. Each pump and alarm set point shall also be displayed accordingly. Pump-on and pump-off set points shall be independently adjustable providing true differential level control. All set points shall be adjusted via the LMS-II operator-interface color touch-screen.
- G. The programmable logic controller (PLC) shall include integral processor, power supply, input and output circuits and communications ports. This specification requires the use of a non-proprietary, commercially available PLC and touch screen operator interface device. Universal, proprietary controllers and/or displays with separate function buttons, indicators and complex multi-level function trees will not be considered equal or acceptable. A built in real time clock shall provide reference for time based control applications. The unit shall include a memory module for backup and portability of user program. Processor on board memory shall be non-volatile. The unit shall provide a minimum of 4K user program space, 4K user data space, 128K data logging and up to 64K for recipe. The processor shall function as specified over an ambient temperature range of -4°F to +140°F with a relative humidity up to 95%, non-condensing. The PLC shall be UL listed for industrial control equipment. To facilitate inter-connectivity the PLC shall include two communications channels, an isolated RS-232/485 communication port and an Ethernet/IP port.
- H. The operator interface panel shall show system status and shall provide the operator with convenient soft screen touch keys for the entry of pass codes, set points, and commands. Screen menu keys shall produce instructional screens that will guide the operator in set point entry and alarm diagnosis. Multi-level password protection shall be available to prevent unauthorized set point changes. All information displayed on the screen shall be in plain English and simple graphic representations of the system components. An alarm log shall be provided at the operator interface. This screen shall allow the user to view a summary of a minimum of 20 alarm occurrences. The screen shall show the time and date at the onset of the alarm.

- I. The operator interface shall consist of an 800 x 600 pixel, color transmissive, TFT active matrix LCD with backlight. The viewing area shall be a minimum of 5.55" x 4.16". The touch panel shall be sealed from dirt & moisture and shall not exhibit parallax within the viewing angle.
- J. Statistical Display Screen:
  - 1. Pump Status (Off/Running/Alarm) (Each Pump)
  - 2. Pump Running Hours (Each Pump)
  - 3. Wet-Well Level
  - 4. Alarm Conditions
  - 5. Transducer Failure
- K. Set-Point Screens:
  - 1. Level Set-Points
  - 2. Alarm Set-Points
- L. Both the transducer and mechanical floats shall incorporate intrinsically safe barriers to maintain a class 1 division 1 safe operation.
  - 1. Provide support brackets as required or shown on the drawings.

## 2.9 FLOAT SWITCH BACK-UP SYSTEM

- A. Sealed float type mechanical switches shall be supplied for back-up in case of transducer failure. The mechanical tube switches shall be sealed in a solid polyurethane float for corrosion and shock resistance. The support wire shall have heavy neoprene jacket and a weight shall be attached to the cord above the float to hold switch in place in sump. The weight shall be above the float to prevent sharp bends in the cord when the float operates under water. The float switches shall hang in the sump supported only by the cord that is held to the wiring channel. Four (4) float switches shall be used to control level. One for pump turn-on lead pump, one for turn on lag pump, one for high water alarm, and one for pump turn-off. Float switches shall be Model No. 2900.

## 2.10 HIGH WATER ALARM

- A. A high water alarm light shall be supplied for mounting on the control box. Alarm light shall glow bright and flash under alarm conditions. Alarm light shall have reset button. Contacts shall be supplied for separate remote alarm in building.

## 2.11 OPERATION OF SYSTEM

- A. On sump level rise, the switches shall energize and start lead pump. With lead pump operating sump level shall lower until the off level is reached, thereby de-energizing the lead pump. Alternating relay shall index on stopping of pump so that lag pump will start on next operation. If sump level continues to rise when lead pump is operating, the lag pump shall start upon reaching the override. Both lead and lag pump shall operate together until the off level is reached. If level continues to rise when both pumps are operating, and the high level is reached, the high level alarm shall be activated. If one pump should fail for any reason, the second pump shall operate on the override control.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of sewerage piping systems to verify actual locations of piping connections before packaged sewage pumping station installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 31200 "Earth Moving."

### 3.3 INSTALLATION

A. Install packaged sewage pumping station components where indicated, according to specific equipment and piping arrangement indicated.

END OF SECTION

SECTION 333100 - S - SANITARY SEWERS (GRAVITY)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Cleanouts.
  - 3. Manholes.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than four business days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Owner's written permission.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements
  - 1. Comply with the City of Elgin and the Fox River Water Reclamation District.

PART 2 - PRODUCTS

- 2.1 All piping, fittings, manholes and accessories shall meet the Regulatory Requirements.

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING

- A. Meet the requirements of the Regulatory Requirements.

City of Elgin  
Elgin Sports Complex Expansion -  
Phase 1

14106.002  
Issue For Bid  
Not For Construction

END OF SECTION

SECTION 334100 - S - STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Catch basins
  - 3. Manholes

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports

1.4 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes and catch basins according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of service.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements
  - 1. Comply with requirements of the City of Elgin and the Standard Specifications for Water and Sewer Main Construction in Illinois.

PART 2 - PRODUCTS

- 2.1 All piping, fittings, manholes, catch basins, and accessories shall meet the regulatory requirements.

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING

- A. Meet the requirements of the Regulatory Requirements.

City of Elgin  
Elgin Sports Complex Expansion -  
Phase 1

14106.002  
Issue For Bid  
Not For Construction

END OF SECTION



PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt damage.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify owner no fewer than two days in advance of proposed interruption of service.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements
  - 1. Comply with requirements of the City of Elgin.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.

2.2 DRAINAGE CONDUITS

- A. Molded-Sheet Drainage Conduits: Prefabricated geocomposite with cusped, molded-plastic drainage core wrapped in geotextile filter fabric.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following:
    - a. American Wick Drain.
    - b. Hydraway.
    - c. JDR Enterprises, Inc.
    - d. TenCate Geosynthetics.
  - 2. Nominal Size: 12 inches high by approximately 1 inch thick.
    - a. Minimum In-Plane Flow: 30 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
  - 3. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.

2.3 SOIL MATERIALS

- A. Soil materials are specified in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 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.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.3 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
  - 1. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping according to ASTM D 2321.

3.4 PIPE JOINT CONSTRUCTION

- A. Join PE and PVC pipe and fittings according to ASTM D 3212.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 DRAINAGE CONDUCT INSTALLATION

- A. Install in accordance with drawings and manufacturer's written instructions.

3.6 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."
- B. Cleanouts for Landscaping Subdrainage:
  - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.

3.7 CONNECTIONS

- A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.

### 3.8 IDENTIFICATION

- A. Provide detailed as-built locations for Owner's maintenance personnel to be able to field locate at-grade and buried cleanouts.

### 3.9 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
  - 2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.
- B. Drain piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.10 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 OF SECTION