Invitation No.: EKU 140-20

Eastern Kentucky University 521
Lancaster Avenue

Richmond, KY 40475

Outdoor Volleyball Courts
THIS IS NOT AN ORDER

Non-Mandatory Pre-Bid Conference: April 30 2020, 2:00PM EST, Behind the Commonwealth building in the upper parking lot
Bid Opening: May 14 2020, 2:00PM EST Commonwealth building lobby

Eastern Kentucky University (EKU) hereby requests sealed bids for the materials, supplies, equipment or services set forth herein, subject to all conditions outlined in this Bid Package, including:

Invitation to Bid ............................................................................................................................................. 1
EKU General Terms and Conditions ............................................................................................................. 20
Project Specifications ................................................................................................................................. 54
Project Drawings ......................................................................................................................................... 237

Note:
If you require a larger format set of plans, you may download them from our website at http://purchasing.eku.edu/solicitations

The University’s General Terms and Conditions and Instructions to Bidders, viewable at https://purchasing.eku.edu/terms-and-conditions, apply to this Invitation to Bid (ITB).
IMPORTANT: BIDS MUST BE RECEIVED BY: May 14 2020, 2:00PM EST

Bids for competitive negotiation shall not be subject to public inspection until negotiations between the purchasing agency and all Offerors have been concluded and a contract awarded to the responsible offeror submitting the proposal determined in writing to be the most advantageous to the University, price and the evaluation factors set forth in the advertisement and solicitations for proposals will be considered.

An award of contract may be made upon the basis of the initial written proposals received without written or oral discussions.

Contracts resulting from this Bid must be governed by and in accordance with the laws of the Commonwealth of Kentucky. The University reserves the right to request proposal amendments or modifications after the bid receiving date.

THE TERMS AND CONDITIONS OF THIS INVITATION TO BID INCLUDE ALL GENERAL CONDITIONS, AS SET FORTH BY EASTERN KENTUCKY UNIVERSITY, PLUS ANY SPECIAL CONDITIONS ENUMERATED HEREIN.

NOTICE

Any agreement or collusion among Offerors or prospective Offerors, which restrains, tends to restrain, or is reasonably calculated to restrain competition by agreement to bid at a fixed price or to refrain from offering, or otherwise, is prohibited.

Any person who violates any provisions of KRS 45A.325 shall be guilty of a felony and shall be punished by a fine of not less than five thousand dollars nor more than ten thousand dollars, or be imprisoned not less than one year nor more than five years, or both such fine and imprisonment. Any firm, corporation, or association who violates any of the provisions of KRS 45A.325 shall, upon conviction, be fined not less than ten thousand dollars or more than twenty thousand dollars.

I hereby swear (or affirm) under the penalty for false swearing as provided by KRS 523.040:

That I am the offeror (if the offeror is an individual), a partner, (if the offeror is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the offeror is a corporation);

That the attached proposal has been arrived at by the offeror independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other Contractor of materials, supplies, equipment or services described in the Request for Proposal, designed to limit independent bidding or competition;

That the contents of the proposal have not been communicated by the offeror or its employees or agents to any person not an employee or agent of the offeror or its surety on any bond furnished with the proposal and will not be communicated to any such person prior to the official closing of the RFP:

That the offeror is legally entitled to enter into contracts with the Eastern Kentucky University and is not in violation of any prohibited conflict of interest, including those prohibited by the provisions of KRS 45A.330 to .340, 164.390, and .396.

That I have fully informed myself regarding the accuracy of the statement made above.

SWORN STATEMENT OF COMPLIANCE WITH CAMPAIGN FINANCE LAWS

In accordance with KRS 45A.110 (2), the undersigned hereby swears under penalty of perjury that he/she has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky and that the award of a contract to a bidder will not violate any provision of the campaign finance laws of the Commonwealth of Kentucky.

The Contractor by signing and submitting a proposal agrees as required by 45A.485 to submit final determinations of any violations of the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 & 342 that have occurred in the previous five (5) years prior to the award of a contract and agrees to remain in continuous compliance with the provisions of the statutes during the duration of any contract that may be established. Final determinations of violations of these statutes must be provided to the University by the successful Contractor prior to the award of a contract.

CERTIFICATION OF NON-SEGREGATED FACILITIES

The Contractor, by submitting a proposal, certifies that he/she is in compliance with the Code of Federal Regulations, No. 41 CFR 60-1.8(b) that prohibits the maintaining of segregated facilities.

SMOKE FREE ZONE POLICY

The Offeror, by signing and submitting a Proposal, agrees to comply with the University’s Smoke Free Zone Policy. See: http://policies.eku.edu/sites/policies.eku.edu/files/policies/tobacco-free_policy_bor_41414.pdf

SUSTAINABILITY POLICY

The University is committed to reducing the adverse environmental impact of its purchasing decisions; it is committed to buying goods and services from contractors who share its environmental concern and commitment. The University encourages bidders to include in their responses economical and environmentally friendly products and service options that serve to minimize waste, reduce excess packing, recycle, reduce, reuse, prevent pollution, and/or offer resource efficiency. It’s the University’s goal to maximize environmental responsibility on its campuses.

SIGNATURE REQUIRED: This proposal cannot be considered valid unless signed and dated by an authorized agent of the Offeror. Type or print the signatory's name, title, address, phone number and fax number in the spaces provided. Offers signed by an agent are to be accompanied by evidence of his/her authority unless such evidence has been previously furnished to the issuing office.

<table>
<thead>
<tr>
<th>Company Name:</th>
<th>Authorized Signature:</th>
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<tbody>
<tr>
<td>Address:</td>
<td>Typed or Printed Name:</td>
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<td>City, State, Zip:</td>
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<td>Phone No:</td>
<td>Federal ID No:</td>
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<td>Fax:</td>
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BID FORMS
INVITATION NUMBER: EKU 140-20

PROJECT: Outdoor Volleyball Courts

PURCHASING INSTRUCTIONS TO BIDDERS

1. Bids must be received in the Division of Purchases and Stores, Commonwealth Building, Room 1411, Richmond, KY in a sealed envelope no later than 2:00PM EST on May 14 2020, at which time all bids received will be publicly opened and read in the Bid Opening Room.

2. Bid envelope shall be addressed as indicated herein below. No responsibility will attach to the Division of Purchases the premature opening of, or the failure to open a bid not properly addressed or identified.

Address bids as follows:

Name & Address of Bidder

Eastern Kentucky University Division of Purchases & Stores
Commonwealth Bldg.
14th Floor, Room 1411
Richmond, KY 40475

PRE-BID CONFERENCE: April 30 2020, 2:00PM EST in the upper parking lot behind the commonwealth building

Questions Due By: May 5 2020, 5:00PM EST – Submit all questions electronically to gary.burns@eku.edu

Temporary parking permits are available thru EKU Parking and Transportation, Commonwealth Hall, 2nd Floor 521 Lancaster Avenue, Richmond, KY 40475, (859) 622-1063. Please request parking permits at least (72) hours prior to campus visit.

3. No bidder may withdraw his bid for a period of thirty (30) calendar days after the date set for the opening of bids. Clerical errors and omissions in the computation of the lump sum bid shall be cause for withdrawal of the bid without forfeit of the bid bond. Bids may be withdrawn in person only prior to the closing date of the receipt of bids.

4. Bids, upon their receipt, are stamped showing the hour and date received. Bids received after the scheduled closing time will not be considered, provided legal and acceptable bids have been received.

5. The right is reserved to reject any and all bids and to waive all informalities and/or technicalities where the best interest of the University may be served.

6. Facsimile bids, or modification of bids by fax, are not permissible and/or not acceptable.

7. Bids may be rejected unless filled out in ink or typewritten and signed in ink.

8. For any clarification of this Invitation to Bid, contact: gary.burns@eku.edu
ARTICLE 1 – INVITATION

Bids are requested by the Division of Purchases & Stores from eligible firms for the furnishing of all labor, materials, tools, equipment, services, supplies, and related items necessary for the construction of outdoor volleyball courts for Eastern Kentucky University complete and in accordance with the terms, conditions, specifications as contained herein, and as shown on drawings and amended by any Addendum which may be issued.

ARTICLE 2 - METHOD OF BIDDING

Bidders shall submit bids as indicated in the form. No other method of bidding will be considered and the bidder must use the Form of Proposal which is included in and made a part of this Invitation. All data and other information requested in said Form of Proposal must be supplied.

ARTICLE 3 - AWARD OF CONTRACT

The award will be made based on BEST VALUE. In determining the lowest responsible and responsive bidder, the following elements will be considered: If the bidder involved maintains a permanent place of business, has adequate plant equipment to perform properly and expeditiously, suitable financial status to meet obligations incidental to the work and has appropriate technical experience. Such information as may be required to make an award determination shall be supplied by apparent low bidder.

(A) The "Owner" reserves the right to reject any and all bids to waive all informalities and/or technicalities of a bid when in the judgment the best interest of Eastern Kentucky University may be served.

(B) In the event the bidder's proposal is accepted by the owner and such bidder shall fail to execute the contract and to furnish satisfactory performance bond within ten (10) calendar days from the date of notification of the award of the contract, the owner may at its option, determine that the awardee has abandoned the contract. Thereupon the proposal shall become null and void and the bid guarantee which accompanied it shall be forfeited to and become the property of the owner as liquidated damaged from such failure. If the bidder shall execute the contract and furnish satisfactory bond, the bid guarantee will be returned to the bidder by the owner.

(C) That a contract is legally entered into will be indicated by the issuance and release of the Eastern Kentucky University purchase order.

ARTICLE 4 - INSURANCE

The contractor shall provide and include in his bid price the cost of the following minimum insurance coverage:

(a) Workman’s Compensation $1,000,000
(b) General Liability $1,000,000 ($2,000,000 Aggregate)
(c) Business Automobile Liability $1,000,000 (each occurrence, any auto owned, hired, or borrowed)

Contractor agrees to furnish Certificates of Insurance for each insurance policy to the Purchasing Official. Eastern Kentucky University, its regents, and employees must be added as Additional Insured on the General Liability policies with regard to the scope of this Contract. Any deductibles or self-insured retentions in the insurance policies must be paid by and are the sole responsibility of the Contractor. Coverage is to be primary and non-contributory with other coverage, if any, purchased by the University. All required insurance policies must include a Waiver of Subrogation in favor of Eastern Kentucky University, its regents, and employees.

ARTICLE 5 –CONSTRUCTION AND SAFETY DEVICES

Refer to Eastern Kentucky University’s General Terms and Conditions below.

ARTICLE 6 - TAXES, WORKMEN'S COMPENSATION, ETC.

The contractor shall be required to accept liability, make payment and include in bid amount all payroll taxes, sales and use tax, and all other taxes or deductions required by federal, state, or local laws such as old age pensions, social security or annuities measured by wages. Provisions of the current Kentucky Sales or Use Tax must be included in the bid amount and paid by the contractor.
ARTICLE 7 - INSPECTION OF WORK
Refer to Eastern Kentucky University’s General Terms and Conditions below.

ARTICLE 8 - PERMITS AND CODES
Refer to Eastern Kentucky University’s General Terms and Conditions below.

ARTICLE 9 - ADDENDA
Any Addenda or Instruction to Bidder issued by the Division of Purchases prior to the time for receiving bids shall be covered in thereof. Such Addenda shall be acknowledged in the Bid Proposal. No instructions or changes shall be binding unless documented by a proper and duly issued Addendum.

Eastern Kentucky University is entitled to exemption from Federal Excise Tax. Exemption certificates will be furnished to cover excise tax exemption where applicable and when requested by the contractor.

ARTICLE 10 - WITHDRAWAL OF BIDS
(a) Prior to closing date for receipt and opening of bids, any bidder may withdraw his bid in person only, at any time prior to the scheduled time for closing and receipt of bids.
(b) After receipt and opening of bids, withdrawal of bids will not be permitted for a period of thirty (30) Calendar days from the date of receipt and opening of bids.

ARTICLE 11 - OR EQUAL
If any material or equipment and/or specifications, unless specifically designated “no substitution” appear in this Invitation which restrict any bidder from bidding whose product is equal in performance, construction, efficiency, etc., to that specified, then, and in that event the bidder may submit a bid on the lowest and best bid here from. The burden of proof of equality shall be the responsibility of the bidder. If the architect/engineer judges the material or equipment not equal to that named in the specifications, the bidder/contractor shall provide material or equipment that is judged to be in compliance with the specifications. The architect/engineer's decision shall be final.

ARTICLE 12 - ALTERNATES
The owner reserves the right to reject any or all alternate bids if provided for in the bid documents. The determination as to the responsive and responsible bid will be made on the basis of the lump sum base bid plus and/or minus any alternate that may be accepted by the owner. Alternates to be used in sequence set forth in the proposal if considered for acceptance.

ARTICLE 13 - AUT HENTICAT ION OF BID AND STATEMENT OF NON-COLLUSION AND NON- CONFLICT OF INTEREST
This document or the Form of Proposal document where applicable, must be executed and signed for the bid to be valid.

ARTICLE 14 - LIQUIDATED DAMAGE (IF APPLICABLE)
See schedule of liquidated damage in attached Project specifications. The contractor affected will be held responsible for any loss to the owner on account of unnecessary delays or failure on his part to prosecute his work in the proper manner.

ARTICLE 15 - BID AND PERFORMANCE AND PAYMENT BOND
(a) Bids shall be accompanied by a bid guarantee of not less than five percent (5%) of the amount of the Base Bid executed by a Surety Company authorized to do business in the state of Kentucky. (Certified check is acceptable)
It is agreed in the event that this proposal is accepted by the owner and the contractor shall fail to execute a contract within ten (10) consecutive calendar days from the date of notification of the Award of Contract, the owner shall determine that the contractor has abandoned the contract; thereupon, the proposal shall become null and void, and the bid guarantee, check, or bid bond which accompanied it shall be forfeited and become the property of the owner as liquidated
damages for such failure and no protest pursuant to such action will be allowed.

(b) The contractor shall furnish a surety bond in an amount equal to one hundred percent (100%) of the contract price as security for the faithful performance of this contract and for the payment of all persons performing labor, including payment of all unemployment contributions which become due and payable under the Kentucky Unemployment Insurance Law furnishing materials in connection with this contract.

(c) This bond and all insurance coverage required by this Invitation and Laws of this State shall be executed by a Surety Company authorized to do business in the state of Kentucky

(d) There shall be an endorsement in each policy, reading as follows: "It is hereby agreed that in event of a claim arising under this policy, the company will not deny liability by reason of the insured being a state, county, Municipal Corporation or governmental agency."

ARTICLE 16 - GENERAL GUARANTY

Refer to Eastern Kentucky University’s General Terms and Conditions below.

ARTICLE 17 - CHANGES IN THE WORK

Refer to Eastern Kentucky University’s General Terms and Conditions below.

ARTICLE 18 - INDEMNITY

Refer to Eastern Kentucky University’s General Terms and Conditions below.

ARTICLE 19 - EMPLOYMENT PRACTICE

(a) The contractor, per State Executive Order 72-51, dated January 18, 1972, shall register from time to time with the State Department Service Office nearest the construction a complete list of all job requirements and positions necessary to perform this contract.

(b) Where persons referred to the contractor, by the State Employment Service, are found to be qualified the contractor is urged to utilize and employ said persons for such jobs.

(c) It is the policy of Eastern Kentucky University to utilize minority vendors and subcontractors whenever possible in order to help bring them into the mainstream of the American economy. Therefore, the contractor, when looking for subcontractors, should make full faith efforts to locate minority business persons. For assistance in identifying minority vendors or subcontractors, the contractor may contact the Kentucky Procurement Assistance Program; 500 Metro Street; Capital Plaza Tower, 23rd Floor; Frankfort, Kentucky 40601-1978; telephone 800.838-3266 or 502-564-2064; fax (502)-564-5932, or e-mail ced.kpap@ky.gov.

(d) Apprentices shall be permitted to work only under an apprenticeship agreement approved by the Kentucky Supervisor of Apprenticeship and by the Kentucky Apprenticeship Council, which is recognized by the Bureau of Apprenticeship and Training, United States Department of Labor.

ARTICLE 20 - NON-DISCRIMINATION IN EMPLOYMENT

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

(a) The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The contractor will take affirmative action to ensure that applicants are treated during employment without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be proved setting forth the provisions of this non-discrimination clause.

(b) The contractor will, in all solicitation or advertisements placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contracts or understanding, a notice to be provided advising the said labor union or worker’s representative of the contractor’s commitment under this section, and shall post copies of the notice in conspicuous places available to employees and
applicants for employment. The contractor will take such action with respect to any subcontractor or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

In case the work to be performed is paid for in whole or in part with funds obtained from the federal government or borrowed on the credit of the federal government pursuant to a grant, loan, insurance or guarantee, during the performance of this contract, the contractor, in addition, agrees to the following:

(d) The contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, or as amended, and by the rules, regulations and relevant orders of the Secretary of Labor.

(e) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, or as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto and will permit access to his books, records, and accounts by the applicable federal agency and/or agencies and the Secretary of Labor for purpose of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the contractor’s non-compliance with non-discrimination clauses of this contract or with any such rules, regulations or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further government contracts or federally-assisted construction contracts, in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, or as amended, and by the rules, regulations and orders of the Secretary of Labor, or as otherwise provided by law.

(g) The contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor, issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the federal agency or Secretary of Labor may direct as a means of enforcing such provisions, including actions for non-compliance. Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the federal agency or Secretary of Labor, the contractor may request the United States to enter into such litigation to protect the interest of the United States.

ARTICLE 21 - PUBLIC WORKS

21.1 Under KRS337 the University or any State Agency shall not have the authority to require any employer to pay to an employee a certain wage or fringe benefit other than as determined by the employer and hourly rates (Minimum Wage) as established by Federal, State, Local or Agency itself.

22.2 DAVIS BACON ACT
(Applicable to federally funded construction projects exceeding $2,000)
Contractor agrees to pay wages to mechanics and laborers at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. Supplier agrees to pay wages and meet the other requirements as specified by Davis-Bacon Act, as amended (40 U.S.C. 3141-3148) as supplemented by the Department of Labor regulations (29 CFR Part 5). Supplier acknowledges that University affiliated entity’s decision to make a Contract with Supplier is conditioned upon the acceptance of the wage determination.

ARTICLE 22- RECIPROCAL PREFERENCE

In accordance with KRS 45A.494, a resident Offeror of the Commonwealth of Kentucky shall be given a preference against a non-resident Offeror. In evaluating proposals, the University will apply a reciprocal preference against an Offeror submitting a proposal from a state that grants residency preference equal to the preference given by the state of the nonresident Offeror. Residency and non-residency shall be defined in accordance with KRS 45A.494 (2) and 45A.494 (3), respectively. Any Offeror claiming Kentucky residency status shall submit with its proposal the notarized affidavit affirming that it meets the criteria as set for in the above referenced statute.

ARTICLE 23 – SERVICE AND SUPPORT PERSONNEL
The University reserves the right of acceptance of all personnel assigned by the Offeror under this Contract. All company personnel of the Successful Offeror must be in appropriate company uniform which includes the company name visibly displayed at all times while on the campus of the University, and in all University buildings. The personnel must be cordial, well-groomed, and cognizant of the fact that they may be entered student living buildings. If, for any reason, the University believes that these guidelines are not being followed, the University will request intervention from appropriate supervisory personnel. If inappropriate behavior occurs, the University shall be entitled to a change in personnel serving the campus.

The Successful Offeror agrees that it will company with the University policy regarding registered sex offenders, and shall not knowingly permit any employee who is a registered sex offender to service the Grand Campus, University residence halls, Model Laboratory School, the basement of the Burrier Building where the Child Development Center is currently located, or any areas of campus or University’s buildings. The Successful Offeror will provide the University with verification of all assigned personnel background check clearance.

ARTICLE 24 - DISBARMENT

Vendor’s signature on this solicitation response certifies that the vendor, and where applicable subcontract vendor, or any other person performing service under this agreement (a) is not now nor have ever been excluded, suspended, disbarred or otherwise deemed ineligible to participate in governmental procurement or other programs (b) and if disbarred, suspended or excluded during the life of the contract, the vendor will notify the University buyer of record within seventy two (72) hours of the vendor becoming aware of the governmental ineligibility.

ARTICLE 25 - KEY EVENT DATES

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<th>KEY EVENT DATES</th>
<th>DATE</th>
<th>TIME</th>
<th>PLACE</th>
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<tbody>
<tr>
<td>Pre-Bid Meeting</td>
<td>4/30/2020</td>
<td>2:00 PM ET</td>
<td>Behind the commonwealth building, upper</td>
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<td>lot <a href="mailto:gary.burns@eku.edu">gary.burns@eku.edu</a></td>
</tr>
<tr>
<td>Questions Deadline</td>
<td>5/5/2020</td>
<td>5:00 PM ET</td>
<td><a href="mailto:gary.burns@eku.edu">gary.burns@eku.edu</a></td>
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<tr>
<td>Bid Opening</td>
<td>5/14/2020</td>
<td>2:00 PM ET</td>
<td>Commonwealth Bldg., Lobby</td>
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All proposals can be made electronically via e-mail eksolicitations@eku.edu no later than 5/14/2020, 2:00 PM, ET. The subject of the e-mail shall be “EKU 140-20”. Failure to provide the correct Bid/RFP number in the email may disqualify your submission.

***Please do not copy the procurement official on electronic bid submissions***

Project Notes:
- Estimated Start Date: 6/1/2020
- Substantial Date for Completion: 11/30/2020
- Final Date for Completion: 12/22/2020

Liquidated Damages:
- $300 until Substantial Completion
- $220 until Final Completion
BIDDER’S CHECK LIST

The following checklist is provided for the convenience of both you and Eastern Kentucky University to help eliminate errors or omissions which may render your bid non-responsive. Please check all appropriate boxes and submit this page with your bid.


2. Affidavit Regarding Workers’ Compensation Insurance. (Notarized)


5. Bid Guaranty in the amount of no less than five percent (5%) of the TOTAL BID AMOUNT. (Vendor Provided)

6. List of Proposed Subcontractors (Vendor Provided)

7. Vendor Identification Form

8. Vendor Insurance Form (ACORD)

9. Resident Bidder Status Affidavit. (Notarized)

10. Bid Sheet

11. Performance Bond (To be provided at time of award.)

12. Payment Bond (To be provided at time of award.)
SWORN STATEMENT REGARDING CAMPAIGN FINANCE LAWS

PURSUANT TO KRS 45A.110 AND KRS 45A.115, AS AMENDED, A DETERMINATION OF RESPONSIBILITY OF A BIDDER OR OFFEROR CANNOT BE MADE UNTIL THE BIDDER OR OFFEROR PROVIDES A SWORN STATEMENT THAT HE HAS NOT KNOWINGLY VIOLATED ANY PROVISION OF THE CAMPAIGN FINANCE LAWS OF THE COMMONWEALTH AND THAT THE AWARD OF A CONTRACT TO A BIDDER OR OFFEROR WILL NOT VIOLATE ANY PROVISION OF THE CAMPAIGN FINANCE LAWS OF THE COMMONWEALTH. TO COMPLY WITH THESE STATUTES THE SWORN STATEMENT REGARDING CAMPAIGN FINANCE LAWS INCLUDED WITH THIS INVITATION FOR BID SHOULD BE SIGNED AND RETURNED WITH YOUR BID. THESE STATUTES CURRENTLY READ AS FOLLOWS:

KRS 45A.110:

(1) A written determination of responsibility of a bidder or offeror shall be made and it shall be made in accordance with administrative regulations promulgated by the secretary of Finance and Administration Cabinet. A reasonable inquiry to determine the responsibility of a bidder or offeror may be conducted. The failure of a bidder or offeror to promptly supply information in connection with such an inquiry may be grounds for a determination of non-responsibility with respect to such a bidder or offeror.

(2) A written determination of responsibility of a bidder or offeror shall not be made until the bidder or offeror provides the Secretary of the Finance and Administration Cabinet with his sworn statement made under penalty of perjury that he has not knowingly violated any provisions of the campaign finance laws of the Commonwealth and that the award of a contract to a bidder or offeror will not violate any provision of the campaign finance laws of the Commonwealth. “Knowingly” means, with respect to conduct or to a circumstance described by a statute defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.

(3) Except as otherwise provided by law, information furnished by a bidder or offeror pursuant to this section may not be disclosed outside of the Division of State Purchasing or the purchasing agency administering the contract without prior written consent of the bidder or offeror.

KRS 45A.115:

Eastern Kentucky University at this time does not prequalify suppliers. Refer to KRS 45A.115 for qualification requirements for bid opportunities with the Finance and Administration Cabinet.

________________________________________________________________________
(SIGNATURE)

________________________________________________________________________
(TITLE)

________________________________________________________________________
(NAME OF COMPANY)

State of ___________________________
County of _________________________
The foregoing statement was acknowledged and sworn to before me this ______ day _____________, 20___, by ___________________________

(Title) _____________________________(Company).

______________________________________
Notary Public

My commission expires: _______________________________
Pursuant to KRS 45A.480, the undersigned hereby swears or affirms, under penalty of perjury, that all contractors and subcontractors employed, or that will be employed, under the provisions of this contract shall be in compliance with the requirements for worker’s compensation insurance under KRS Chapter 342 and unemployment insurance under established KRS Chapter 341.

(SIGNATURE)

(TITLE)

(NAME OF COMPANY)

State of ____________________

County of ____________________

The foregoing statement was acknowledged and sworn to before me this

______________ day ______________, 20__, by ________________________________

(Title) ______________________(Company).

________________________________________  Notary Public

My commission expires: ____________________________
Pursuant to 1994’s Senate Bill 258, the Bidder/Offeror shall reveal to the Commonwealth, prior to this award of a contract, any final determination of a violation by the contractor within the previous five (5) year period of the provisions of KRS Chapters 136, 139, 141, 337, 338, 341, and 342.

For the purpose of complying with the provisions of Senate Bill 258, please list any final determination (s) of violation (s) of KRS Chapters 136, 139, 141, 337, 338, 341 and 342, which have been rendered against the bidder or Offer within the five (5) years preceding the award of this contract.

Please include the date of the determination and the state agency issuing the determination.

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<th>KRS VIOLATION</th>
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The Contractor is further notified that 1994’s Senate Bill 258 requires that for the duration of this contract, the Contractor shall be in continuous compliance with the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342, which apply to the Contractor’s operations. Senate Bill 258, further provides that the Contractor’s failure to reveal a final determination of a violation of KRS Chapters 136, 139, 141, 337, 338, 341, and 342, or failure to comply with the above-cited statutes for the duration of the contract, shall be grounds for the Commonwealth’s disqualification from eligibility to bid or submit proposals to the Commonwealth for a period of two (2) years.
**BIDDER'S QUALIFICATIONS**

The Bidder’s qualifications are required by the Owner to be submitted as set forth herewith:

1. This firm is a Corporation or a Partnership or a Proprietorship.

2. A Permanent place of business is maintained at:

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<th>STREET</th>
<th>CITY</th>
<th>STATE</th>
<th>ZIP CODE</th>
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<table>
<thead>
<tr>
<th>TELEPHONE NUMBER</th>
<th>AREA CODE</th>
</tr>
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<tbody>
<tr>
<td>...</td>
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</tr>
</tbody>
</table>

3. In the event the contract is awarded, the undersigned, Surety Bonds will be furnished by:

   | ... |
   | ... |

4. Experience of Contractor on other similar work: List contact information for list projects.

   | ... |
   | ... |
   | ... |
   | ... |
   | ... |

5. We now have the following jobs under contract and bonded:

<table>
<thead>
<tr>
<th>JOB</th>
<th>LOCATION</th>
<th>$ TOTAL CONTRACT</th>
<th>PERCENT COMPLETED</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
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</tbody>
</table>
**TAXPAYER IDENTIFICATION NUMBER REQUEST**

Eastern Kentucky University requires a Federal Tax Identification number or Social Security number for all vendors or persons doing business with the University in order to comply with Federal Regulations and tax reporting requirements. Completion of this vendor form does not guarantee receipt of competitive bid solicitations. If you are interested in obtaining University solicitations, please visit [http://purchasing.eku.edu/bids-and-quotes](http://purchasing.eku.edu/bids-and-quotes)

IF SENDING A W-9, PLEASE RETURN THIS FORM ALSO.

For your convenience, you may return the information one of the following ways:

**FAX:** Vendor File @ 859-622-2170

**MAIL:** Purchasing Division 
Eastern Kentucky University
Commonwealth Bldg., 14th Floor, Room 1401
521 Lancaster Avenue, Richmond, Kentucky 40475

**PHONE #** (859)622-2246

---

**VENDOR INFORMATION**

<table>
<thead>
<tr>
<th>Name of Firm * (Company or Individual)</th>
<th>Phone Number *</th>
<th>Make Checks Payable To *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address *</td>
<td>Fax Number *</td>
<td>Payment Address *</td>
</tr>
<tr>
<td>Address</td>
<td>Web Site Address or E-mail</td>
<td>Payment Address</td>
</tr>
<tr>
<td>Address</td>
<td>Vendor Representative</td>
<td>Name on Invoice *</td>
</tr>
<tr>
<td>City * State * Zip* Federal Tax ID Number *</td>
<td>Social Security Number *</td>
<td></td>
</tr>
</tbody>
</table>

Willing to accept ACH payments * Yes ☐ No ☐

Bank Name & Routing #

Willing to accept credit card payments* Yes ☐ No ☐

Payment Terms *

*Required Fields

**CERTIFICATION**

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me) and

2. I am not subject to backup withholding because:
   a. I am exempt from backup withholding, or
   b. I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or
   c. The IRS has notified me that I am no longer subject to backup withholding, and

3. I am a U.S. person (including a U.S. resident alien). Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholdings because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct Taxpayer Identification Number.

Signature of U.S. Person ___________________________ Date ________________

☐ Federal Debarment Status

By checking the box above, you certify that your company and its principals have not been disbarred, suspended, proposed for debarment, declared ineligible, are not in the process of being disbarred or are voluntarily excluded from doing business with a federal department or agency of the federal government.

---

| Type of Ownership (Check Appropriate Box(es)) * | Business Classification (Check Appropriate Box(es)) *
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ (1) Individual/Sole Proprietorship</td>
<td>☐ (SM) Small Business</td>
</tr>
<tr>
<td>☐ (2) Partnership</td>
<td>☐ (LG) Large Business</td>
</tr>
<tr>
<td>☐ (3) Corporation-Incorporated in (State)</td>
<td>☐ (CT) In County</td>
</tr>
<tr>
<td>☐ (4) Non-profit/education</td>
<td>☐ (MN) Minority Owned</td>
</tr>
<tr>
<td>☐ (5) Non-Resident Alien</td>
<td>☐ (WO) Women Owned</td>
</tr>
<tr>
<td>☐ (6) Exempt from backup withholding</td>
<td>☐ (SD) Small Disadvantaged Business</td>
</tr>
<tr>
<td>☐ (Other)</td>
<td>☐ (GA) Government Agency</td>
</tr>
<tr>
<td></td>
<td>☐ (IP) Non-Profit</td>
</tr>
<tr>
<td></td>
<td>☐ (AL) Alumni Owned</td>
</tr>
<tr>
<td></td>
<td>☐ (HZ) Hub Zone Small Business</td>
</tr>
<tr>
<td></td>
<td>☐ (NP) Non-Profit</td>
</tr>
</tbody>
</table>

**Required Fields**


Printed Name of Authorizing Official: ___________________________ Date: ________________

Authorized Signature: ___________________________ Date: ________________
REQUIRED AFFIDAVIT FOR BIDDERS, OFFERORS AND CONTRACTORS CLAIMING RESIDENT BIDDER STATUS

FOR BIDS AND CONTRACTS IN GENERAL:
The bidder or offeror hereby swears and affirms under penalty of perjury that, in accordance with KRS 45A.494(2), the entity bidding is an individual, partnership, association, corporation, or other business entity that, on the date the contract is first advertised or announced as available for bidding:

1. Is authorized to transact business in the Commonwealth;
2. Has for one year prior to and through the date of advertisement
   a. Filed Kentucky corporate income taxes;
   b. Made payments to the Kentucky unemployment insurance fund established in KRS 341.49; and
   c. Maintained a Kentucky workers’ compensation policy in effect.

The BIDDING AGENCY reserves the right to request documentation supporting a bidder’s claim of resident bidder status. Failure to provide such documentation upon request shall result in disqualification of the bidder or contract termination.

Signature  ________________________________  Printed Name  ________________________________

Title  ________________________________  Date  ________________________________

Company Name  ________________________________

Address  __________________________________________

                                                                                       

Subscribed and sworn to before me by  ________________________________  (Affiant)  ________________________________  (Title)

of this day of , 20___.

(Company Name)

Notary Public

[seal of notary]  My commission expires:  ____________________
FORM OF PROPOSAL-BID SHEET

BID: EKU 140-20

PROJECT NAME: Outdoor Volleyball Complex

LUMP SUM BASE BID:

The Bidder agrees to furnish all materials, supplies, and services required to complete the above referenced job for Eastern Kentucky University, in accordance with the drawings, specifications and contract documents, and any duly issued Addenda for the LUMP SUM BASE BID AMOUNT set forth below:

Bidder’s Name: ________________________________________________________________

__________________________________________________________________________ Dollars

(USE WORDS)

and__________________________________________________________________________ Cents

($______________________________).

Alternate (if applies): ($______________________________).

(USE FIGURES)

The Bidder, in compliance with your Invitation to Bid # EKU 140-20 and having carefully examined the drawings and complete contract documents as defined in the specifications hereby proposes to furnish all labor, materials, supplies, and services required to perform the specifics of this project within the time set forth therein and for the stated lump sum bid amount.

The Bidder hereby acknowledges receipt of the following Addenda:

ADDENDUM NO. _____ DATED __________

ADDENDUM NO. _____ DATED __________

ADDENDUM NO. _____ DATED __________

(IF NO ADDENDUM HAS BEEN ISSUED AND RECEIVED, INSERT THE WORD, “NONE”)
EASTERN KENTUCKY UNIVERSITY
BID # EKU 140-20

LIST OF UNIT PRICES

Unit prices shall include the furnishing of all labor, materials, supplies, services and shall include all items of cost, overhead and profit for the Contractor and any Subcontractor involved, and shall be used uniformly without modification for either additions or deductions. The Unit Prices as established shall be used to determine the equitable adjustment of the Contract Price in connection with changes or extra work performed. **Unit prices must be submitted with the Form of Proposal.**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; CONCRETE PAVEMENT</td>
<td>$______________/ SY</td>
</tr>
<tr>
<td>4&quot; CONCRETE PAVEMENT</td>
<td>$______________/ SY</td>
</tr>
<tr>
<td>CONCRETE CURB &amp; GUTTER</td>
<td>$______________/ LF</td>
</tr>
<tr>
<td>CONCRETE HEADER/EDGE CURB</td>
<td>$______________/ LF</td>
</tr>
<tr>
<td>ASPHALT PAVEMENT (FULL PROFILE)</td>
<td>$______________/ SY</td>
</tr>
<tr>
<td>ASPHALT PAVEMENT (RESURFACE)</td>
<td>$______________/ SY</td>
</tr>
<tr>
<td>VOLLEYBALL SAND</td>
<td>$______________/ CY</td>
</tr>
<tr>
<td>WASHED DRAINAGE STONE</td>
<td>$______________/ CY</td>
</tr>
<tr>
<td>ASPHALT PAVEMENT REMOVAL/HAUL-AWAY</td>
<td>$______________/ CY</td>
</tr>
<tr>
<td>EXCAVATION</td>
<td>$______________/ CY</td>
</tr>
<tr>
<td>STUCCO WALL FINISH</td>
<td>$______________/ SF</td>
</tr>
<tr>
<td>6' PICKET FENCE</td>
<td>$______________/ LF</td>
</tr>
</tbody>
</table>
Bidders are hereby advised that this list may be completed and submitted with Bid. In the event this list does not accompany the Bid, the Owner will require the Bidder to completely fill out this list within one hour of the official closing of the reading of the bids. Failure to submit a proper list may result in the rejection of the bidder’s proposal.

Where more than one “make” or “brand” is listed for a given item, the Owner shall have the right to select the one to be installed.

The following is the list of materials and equipment referenced in the bid submitted by:

(Bidder) ....................................................................................................................................................................................

Dated ....................... and which is an integral part of the Bid Form.

<table>
<thead>
<tr>
<th>ITEM:</th>
<th>MANUFACTURER AND BRAND NAME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Electrical Panels</td>
<td></td>
</tr>
<tr>
<td>2. Surge Suppression Devices</td>
<td></td>
</tr>
<tr>
<td>3. Sports Lighting</td>
<td></td>
</tr>
<tr>
<td>4. Ornamental Fencing</td>
<td></td>
</tr>
<tr>
<td>5. Sports Netting System</td>
<td></td>
</tr>
<tr>
<td>6. Shower/Rinse Stations</td>
<td></td>
</tr>
</tbody>
</table>
This list of Proposed Subcontractors is required by the Owner to be executed, completed, and submitted with Bidder’s Proposal. All subcontractors are subject to approval by the Owner, Landscape Architect or Engineer. Failure to submit this list, in its entirety, may cause a rejection of the Bidder’s Proposal. If certain branches of the work are to be performed by the Prime Contractor, then so state.

(Bidder) ....................................................................................................................................................................................

Dated ....................... and which is an integral part of the Bid Form.

<table>
<thead>
<tr>
<th>BRANCH OF WORK</th>
<th>NAME, ADDRESS, PHONE NO. OF SUBCONTRACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Electrical Contractor:</td>
<td></td>
</tr>
<tr>
<td>2. Concrete Contractor:</td>
<td></td>
</tr>
<tr>
<td>3. Asphalt Contractor:</td>
<td></td>
</tr>
<tr>
<td>4. Excavator:</td>
<td></td>
</tr>
<tr>
<td>5. Fencing Contractor:</td>
<td></td>
</tr>
</tbody>
</table>
Eastern Kentucky University General Conditions
# EASTERN KENTUCKY UNIVERSITY
## GENERAL CONDITIONS

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Revised 02-10-17
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<th>Page</th>
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</thead>
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<tr>
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</tr>
<tr>
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<td>26</td>
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<td>35</td>
</tr>
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</tr>
<tr>
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<td>36</td>
</tr>
<tr>
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<td>37</td>
</tr>
</tbody>
</table>
1. **Definitions of Terms.** Whenever used in these General Conditions or in other Contract Documents, the following terms have the meaning indicated, which are applicable to both the singular and plural thereof:

1.1 **Architect** is the person or entity, either architect, engineer, or consultant, who is identified as such in the Contract Documents and on the drawings or any replacement architect, engineer, or consultant identified by the Owner.

1.2 **Certification of Payment** is the Owners Progress Payment form, Invoice and Receiving Report for Technical Services and Construction Contracts.

1.3 **Change Order** means a written order to the Contractor from the Owner and the Architect after execution of the Contract, which directs a change in the Work and may include a change in the Contract Price or the Contract Completion Time, or any combination thereof.

1.4 **Contract** is the legal relationship, duties and obligations between the Owner and Contractor as shown by the Contract Documents for the Project.

1.5 **Contract Completion Time** is the number of calendar days between the Date of Commencement and the dates set for Substantial Completion and Final Completion of the Work. This includes any adjustments established in the Contract between the Owner and Contractor.

1.6 **Contract Documents** include the Invitation for Bids, the Instructions to Bidders, the Payment and Performance Bonds, the General Conditions, the Special or Supplemental Conditions, the drawings, specifications, solicitation addenda, the contractors response to the solicitation, any written clarification of the response, the award document containing the Agreement between Owner and Contractor, and modifications issued after execution of the Contract. Modifications include (1) Change Orders issued as provided in Article 22, and (2) Field Orders for minor changes in the work issued by the Architect as provided in Article 22. Documents not included or expressly contemplated in this Paragraph, 1.6, do not, and shall not, form any part of the Contract between the Owner and the Contractor.

1.7 **Contract Sum** means the sum stated in the Contract including any authorized adjustments thereto and is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents.

1.8 **Contractor** means the person or entity with whom the Owner has executed the Contract for construction.

1.9 **Date of Commencement** is the date specified in the Contract as the date upon which the Contractor is authorized to begin work.

1.10 **Direct Expenses** is defined as “All items of expenses directly incurred by or attributable to a specific project, assignment or task” and “Direct costs consist of direct materials, direct labor, subcontract costs, and other miscellaneous direct costs such as bonding and equipment rentals, that are directly related to and can be specifically attributed to an individual contract.”

1.11 **Drawings** are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

1.12 **Extra Work** is Work not part of the existing Contract Documents which is being added to the Contract by Change Order.

1.13 **Field Order** is a written order issued by the Architect which clarifies or interprets the Contract Documents, or orders minor changes in the Work which does not require a change under Article 22.
1.14 **Final Completion** is defined as the Work being acceptable under the Contract Documents and the Contract fully performed in accordance with the terms and conditions of the Contract Documents and the entire payment balance due the Contractor is due and payable.

1.15 **Final Completion Date** shall have the meaning as described to it in Paragraph 46.3.

1.16 **Notice of Intent to Award** is a written letter issued to the apparent successful Contractor after acceptance of bid price, unit prices, subcontractors and equipment and materials to inform them of such acceptance and request the required additional documentation to initiate the Contract. This is **NOT an authorization to proceed**.

1.17 **Owner** means Eastern Kentucky University, acting through the Division of Capital Construction and Project Administration.

1.18 The **Project** is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner or by separate Contractors.

1.19 **Resident Observer** means an individual who has a direct contract with the Architect to observe and report on activities at the work site. A Resident Observer employed by the Architect is not authorized to serve as the Owners Representative, unless so designated by the Owner in writing.

1.20 **Retainage** means money earned by a contractor for work accepted by the Owner, but withheld to ensure proper performance by the contractor.

1.21 **Shop Drawings** means drawings, completion diagrams, schedules, and other data specially prepared for the Work by the Contractor or any Subcontractor, lower tier subcontractors, manufacturer, supplier, or distributor to illustrate some portion of the Work.

1.22 **Subcontractor** means the person or entity having a direct contract with the Contractor for the performance of a part of the Work.

1.23 **Substantial Completion** is the point at which, as certified in writing by the Architect, the Project is at a level of completion in strict compliance with the Contract, and necessary approval by public authorities has been given, such that the Owner or the Agency can enjoy beneficial use or occupancy and can use, operate and maintain (the Owner has received all required warranties and documentation) it in all respects, for its intended purpose. Partial use or occupancy of the Project shall not result in the Project being deemed substantially complete and such partial use or occupancy shall not be evidence of Substantial Completion.

1.24 **Substantial Completion Date** shall have the meaning as described to it in Paragraph 46.2.

1.25 The **Work** includes the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, supervision, materials, equipment, services, and things provided or to be provided by the Contractor to fulfill the Contractor’s obligations.

2. **Intent and Interpretation**

2.1 Anything that may be required, implied or inferred by the documents which make up the Contract, or any one or more of them, shall be provided by the Contractor for the Contract Sum;

2.2 Nothing contained in the Contract Documents shall create, nor be interpreted to create, privity or any other relationship whatsoever between the Owner and any person except the Contractor;
2.3 When a word, term, or phrase is used in the Contract Documents, it shall be interpreted or construed first, as defined herein; second, if not defined, according to its generally accepted meaning in the construction industry; and third, if there is no generally accepted meaning in the construction industry, according to its common and customary usage;

2.4 The words “include”, “includes”, or “including”, shall be deemed to be followed by the phrase, “without limitation”.

2.5 The specification herein of any act, failure, refusal, omission, event, occurrence or condition as constituting a material breach of the resulting Contract shall not imply that any other, non-specified act, failure, refusal, omission, event, occurrence or condition shall be deemed not to constitute a material breach of the resulting Contract;

2.6 In the event of any conflict, discrepancy, or inconsistency, the following shall control:

2.6.1 As between figures given on plans and scaled measurements, the figures shall govern; In the event of a conflict between figures on the plans, the Contractor shall obtain clarification from the Architect prior to proceeding with the related work.

2.6.2 As between large scale plans and small scale plans, the large scale plans shall govern;

2.6.3 As between plans and specifications, the requirements of the specifications shall govern;

2.7 **Meaning of Execution.** Execution of the Contract Documents by the Contractor is a representation that the Contractor has thoroughly examined the site of the Work, become familiar with the local conditions under which the Work is to be performed, and correlated personal observations with the requirements of the Contract Documents. Execution of the Contract Documents is a further representation that Contractor has received, reviewed and carefully examined all of the Contract Documents, and has found them in all respects to be complete, accurate, adequate, consistent, coordinated and sufficient for construction, the Contractor is fully qualified to act as the contractor for the Project and has, and shall maintain, any and all licenses, permits or other authorizations necessary to act as the contractor for, and to construct the Project.

2.8 **Prior Agreements.** The Contract Documents supersede any and all prior discussions, communications, representations, understandings, negotiations or agreements between the Owner and the Contractor and the Agency and the Contractor.

2.9 **Contractor’s Performance.** The Contractor shall perform all of the Work required, implied or reasonably inferable from the Contract including, but not limited to, the following:

2.9.1 Construction of the Project;

2.9.2 The furnishing of any required surety bonds and insurance;

2.9.3 The provision or furnishing, and prompt payment therefor, of labor, supervision, services, materials, supplies, equipment, fixtures, appliances, facilities, tools, transportation, storage, power, fuel, heat, light, cooling, or other utilities, required for construction and all necessary building permits and other permits required for the construction of the Project;

2.9.4 The creation and submission to the Owner of detailed and comprehensive as-built drawings, depicting all as-built construction. Said as-built drawings shall be submitted to the Owner upon final completion of the Project and receipt of same by the Owner shall be a condition precedent to final payment to the Contractor.
2.10 Time. All limitations of time set forth in the Contract Documents are material and are of the essence of the Contract. The Contractor shall make reasonable progress on the completion of the Work on a continual and consistent basis.

2.11 Intent of Contract Documents. The intent of the Contract Documents is to include all items necessary for the proper completion of the Work by the Contractor. Labor or materials which are evidently necessary to produce the desired results, even though not specifically mentioned in the Contract Documents, shall be included in the Work.

2.12 Contract Documents Complementary, etc. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. In case of conflicts between the various Contract Documents, the order of precedence shall be as follows: (1) Addenda, (2) Division 1 - General Requirements of the Specifications; (3) Special Conditions, (4) General Conditions, (5) Technical provisions of the Specifications; (6) Drawings.

2.13 Questions to Architect. In the event a question arises regarding the meaning or intent of the drawings and specifications, the Contractor shall report it at once to the Architect. The Architect shall furnish, with reasonable promptness, additional instructions, by means of drawings or otherwise, necessary for the proper execution of the work, consistent with the requirements of Article 3.

2.14 Paragraph, titles or headings are for convenience only and form no operative part of the Contract.

3. The Architect. Unless otherwise directed by the Owner in writing, the Architect shall perform those duties and discharge those responsibilities allocated to the Architect in the Contract Documents. The duties, obligations and responsibilities of the Architect shall include, but are not limited to, the following:

3.1 Owner’s Representative. The Architect will be the Owner’s Agent during construction and until final payment has been made. The Architect will advise and consult with the Owner. In the event the Owner should find it necessary or convenient to replace the Architect, the Owner shall retain a replacement architect and the role of the replacement architect shall be the same as the role of the Architect.

3.2 Communication Through Architect. Except as otherwise provided in the Contract Documents, the Owner’s instructions to the Contractor shall be forwarded through the Architect, and the Contractor’s communications with the Owner shall be through the Architect.

3.3 Review of Work. The Architect shall approve, or respond otherwise as necessary concerning shop drawings or other submittals received from the Contractor. The Architect shall be authorized to refuse to accept work which is defective or otherwise fails to comply with the requirements of the Contract. If the Architect deems it appropriate, the Architect shall be authorized to call for extra inspection or testing of the work for compliance with requirements of the Contract. The Architect shall review the Contractor’s Payment Requests and shall approve in writing those amounts which, in the opinion of the Architect, are properly owing to the Contractor as provided in the Contract. The Architect shall perform those inspections required by the Owner. The Architect shall have authority to reject Work which does not conform to the Contract Documents. In the event of rejection, the Architect may recommend withholding payment to the Contractor for the rejected Work, and such recommendation shall give the Owner the authority to withhold payment for such Work.

3.4 Interpretation of Contract Documents. The Architect shall be the interpreter of the
requirements of the Contract Documents and the judge of the performance thereunder by the Contractor, subject to the provisions of Article 32. Claims, disputes, and other matters in question that arise relating to the execution or progress of the Work shall be referred initially to the Architect for decision, which he will render in writing within a reasonable time. Either party may appeal the Architect’s decision to the VP of Finance and Administration in accordance with the provision of Article 30.

3.5 Review of Shop Drawings, etc. The Architect shall review and approve, or take other appropriate action upon Contractor’s submittals (such as Shop Drawings, product data, and samples) for conformance with the design concept and the information given in the Contract Documents. Such action shall be taken with reasonable promptness so as to cause no delay. The Architect’s approval of a specific item shall not indicate approval of an assembly of which the item is a component. The Architect’s approval of Shop Drawings or samples shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless the Contractor has in writing called the Architect’s attention to such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall any approval by the Architect relieve the Contractor from responsibility for errors or omissions in the Shop Drawings.

3.6 Preparation of Change Orders. The Architect, in consultation with the Owner, shall prepare Change Orders. The Architect shall also have authority to order minor changes in the Work as provided in Article 22.11.

3.7 Final Inspections, Certification. The Architect shall conduct inspections to determine the dates of Substantial Completion and Final Completion. The Architect shall also receive and forward to the Owner, for the Owner’s review, written warranties and related documents required by the Contract and assembled by the Contractor.

3.8 Payment Requests. The Architect shall review the Contractor’s Payment Requests and shall approve in writing those amounts which, in the opinion of the Architect, are properly owing to the Contractor as provided in the Contract. The Architect’s approval of payment requests shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents.

3.9 The Architect shall be authorized to require the Contractor to make changes which do not involve a change in the Contract Sum or in the Contract Completion Time for the Contractor’s performance consistent with the intent of the Contract.

3.10 The duties, obligations and responsibilities of the Contractor under the Contract shall in no manner whatsoever be changed, altered, discharged, released, or satisfied by any duty, obligation or responsibility of the Architect. The Contractor is not a third-party beneficiary of any Contract by and between the Owner and the Architect. It is expressly acknowledged and agreed that the duties of Contractor to the Owner are independent of, and are not diminished by, any duties of the Architect to the Owner.

3.11 The duties, obligations and responsibilities of both the Architect and the Contractor, under their respective Contracts, shall in no manner whatsoever be changed, altered, discharged, released, or satisfied by any duty, obligation or responsibility of the Resident Observer. It is expressly acknowledged and agreed that the duties of Contractor and/or Architect to the Owner are independent of, and are not diminished by, any duties of the Resident Observer to the Owner.

4. Conduct

4.1 General The conduct of all personnel performing work or operations related to the work is the responsibility of the Contractor. The consumption of alcohol and/or
drugs, and the carrying of firearms on the job by any worker are strictly prohibited. Any workmen apprehended under the influence of alcohol and/or drugs, or carrying firearms, on the premises at any time shall be subject to automatic dismissal by the Contractor. Improper conduct of any kind will not be permitted and may result in the offending workmen, Subcontractor and/or Contractor being barred from the university premises.

4.2 Any interaction with the students, faculty, staff or visitors of EKU shall be professional. Unprofessional conduct including, but not limited to, dress, general harassment, sexual harassment, or using obscenities can and shall be grounds for immediate removal of perpetrator from campus.

4.3 The University reserves the right of acceptance of all personnel assigned by the Offeror under this contract. The personnel must be cordial, well-groomed and cognizant of the fact that they may be entering student living buildings. If for any reason, the University believes that these guidelines are not being followed, it will request intervention from appropriate supervisory personnel. If inappropriate behavior occurs, the University shall be entitled to a change in personnel serving the campus.

4.4 The successful Offeror agrees that it will comply with the university Policy regarding Registered Sex Offenders and shall not knowingly permit any employee who is a registered sex offender to service the University residence halls, Model Laboratory School, the basement of the Burrier Building where the Child Development Center is currently located, or any areas of campus or University’s buildings. The University at any time can ask for personnel background check report to be provided by successful Offeror.

4.5 No University garbage containers shall be used by contractor for disposal of any debris.

4.6 Many Buildings on Campus are open to the public. The Contractor shall ensure that its employees and subcontractors access University property only when necessary and appropriate.

5. Tobacco-Free Campus

5.1 The use of all tobacco is prohibited on all property that is owned, leased, occupied, or controlled by the University. This includes buildings and structures, residence halls, housing facilities operated by Employee Housing, grounds, exterior open spaces, parking lots, and garages, on-campus sidewalks, streets, driveways, stadiums, recreational spaces, practice fields, University property outside the main campus such as regional campuses, farm facilities, art galleries, performance venues, and sporting venues and functions that are held in these facilities and venues.

5.2 The use of tobacco is prohibited in vehicles owned, leased or rented by the University, including maintenance Vehicles, automobiles, shuttles, utility vehicles, and golf carts as well as in personal vehicles on University property.

5.3 Tobacco includes all forms of tobacco including, but not limited to, cigarettes, cigars, pipes, water pipes (hookah), electronic cigarettes, bidis, clove cigarettes and smokeless tobacco products (snuff, chewing tobacco, and dipping tobacco). Tobacco does not include nicotine replacement therapies such as patches, gum or prescription medication intended to assist an individual in quitting the use of tobacco.

6. Safety

6.1 Material Safety Data Sheets must be kept at the job site at all times.
6.2 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Project.

6.3 The Contractor shall take all necessary precautions for the safety of employees on the Work site, and shall comply with all applicable provisions of federal, state, and municipal safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where the Work is being performed. The Contractor shall designate a responsible member of his organization on the Work site as safety officer whose duty shall be to enforce safety regulations. The name and position of the person so designated shall be reported to the Architect by the Contractor.

6.4 Fire protection must be maintained at job site at all times. Contractors must carry and maintain and useable portable fire extinguishers on all work trucks.

6.5 If an emergency occurs affecting the safety of life, or of the work, or of adjoining property, the contractor shall act at his own discretion to prevent such threatening loss or injury without special instruction or authorization from the Owner.

7. **Green Purchasing Policy**

   The University is committed to reducing the adverse environmental impact of its purchasing decisions; it is committed to buying goods and services from contractors who share its environmental concern and commitment. The University encourages bidders to include in their responses economical and environmentally friendly products and service options that serve to minimize waste, reduce excess packing and packaging, recycle, reduce, reuse, prevent pollution, and/or offer resource efficiency. It is the University’s goal to maximize environmental responsibility on its campuses.

8. **Recycling and Waste Management Policy**

   8.1 The University recognizes the need to be good stewards for its waste management practices and policies and recognizes the importance of having vendors and/or their subcontractors be cognizant of the same practices and policies. Some jobs may, upon discretion of the university, require a waste and recycling plan, while others may consist of individual considerations for a particular job on means and methods of handling of various discarded material. The University encourages each vendor to be proactive in reviewing all avenues available to them for reducing the waste stream and encourage recycling to the greatest extent possible and practical.

   8.2 KRS 45A.520 mandates that every state agency require a minimum recycled content for those materials it purchases. All materials provided for the completion of the Work shall conform with the requirements of 200 KAR 5:330, except as provided for in KRS 45A.510. Construction related materials requiring a minimum recycled content include building insulation, aluminum products, concrete, cement and steel products. For a complete listing of those items requiring minimum recycled content please refer to 200 KAR 5:330 http://www.lrc.state.ky.us/kar/200/005/330.htm

9. **Parking**

   9.1 Ensure proper parking permits are obtained before commencing work. Under normal circumstances, the contractor will be allowed two vehicles at the work site. All other vehicles will be given permits to park in a Commuter Lot. See Special Conditions for Project-specific parking instructions.

   9.2 No leaking vehicles are allowed to park on campus.
9.3 The University reserves the right to remove contractor’s vehicles from university property due to leaking of any fluids and charge contractor for any cleanup.

9.4 No parking on sidewalks or grass.

10. **Traffic Control**

10.1 Vehicles shall be parked in a manner that will not interfere with any required emergency exit, or the traffic of the campus.

10.2 EKU shall receive 48 hour advanced notice of any deliveries that will affect others on campus.

10.3 Contractor shall not block fire truck access unless approved in advance and only in extreme circumstances. (48 hour advanced notice to owner must be given).

11. **Pedestrian and Property Protection**

11.1 Provide temporary barricades and other forms of protection to protect EKU's personnel, students and general public from injury due to the Work. These barricades are to be maintained daily and kept in orderly manner. EKU will not provide any barricades. A barricade plan shall be discussed at the preconstruction meeting.

11.2 The Contractor shall continuously maintain adequate protection of all Work from damage and shall protect the Owner’s property from injury or loss arising in connection with this Contract. The Contractor shall make good any such damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or caused by agents or employees of the Owner. He shall adequately protect adjacent property as provided by law and the Contract Documents.

11.3 It is the contractor’s responsibility to protect their work from vandalism.

11.4 Provide protection of the Work and all University property during dust producing operations.

11.5 Damages to any existing Buildings, including the University roads, parking lots, drives, walks, and grass, etc., resulting from the Work or related operations whether caused by the Contractor's personnel, his Subcontractors or his material suppliers, shall be repaired or replaced, at no additional cost to the University, and to the satisfaction of the Owner.

11.6 Protect all roads and sidewalks from damage by equipment such as cranes or dump trucks when stationed for long periods of time by appropriate methods.

11.7 Contractor shall call 811 and notify EKU at least three (3) business days prior to the commencement of any excavation.

12. **Concrete Surfaces**

Detailed concrete flatwork replacement specification is available in the Technical Guidelines document.

13. **Hazardous Material-Call Project Manager Immediately if Suspicious**

13.1 In the event the Contractor suspects or unexpectedly encounters on the site material reasonably believed to be asbestos, lead, polychlorinated biphenyl (PCB) or other classified hazardous substances/materials which have not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos, lead, polychlorinated biphenyl (PCB), or other classified hazardous substances/materials which have not been rendered harmless. The Work in the affected area shall be resumed in the absence of any classified hazardous substances/materials or when it or they have been rendered harmless.
13.2 The Project Manager shall then contact the proper university officials to take samples, conduct tests and report back to the contractor within a few days.
13.3 If the material is determined to be positive on test, the University will take appropriate action to remove the material before the contractor can continue work in the affected area.

14. Site Conditions
14.1 No parking on grass or sidewalks.
14.2 The Contractor shall maintain all materials and organize the Work in such a manner as to minimize any inconvenience to persons using or working in the Work site and adjacent areas.
14.3 The Contractor shall restrict his operations and movements in areas of the buildings, grounds that are strictly necessary to his work.
14.4 Contractor shall assume complete responsibility for disposing of equipment removed from the site during the work. Contractor shall remove, transport, and dispose of all debris. Contractor shall maintain a conveyance adjacent to the work in which debris shall be deposited as it is removed from the work. He shall cause the conveyance to be emptied on a regular basis. Contractor shall not use building elevators for transporting any material or debris unless authorized in the Special Conditions.
14.5 Contractor shall not use owner’s trash cans for disposal of waste.
14.6 EKU assumes no responsibility for actual condition of items, grounds or structures at areas of work. Conditions existing at time of inspection for bidding purposes will be maintained by EKU insofar as practicable. Photograph or videotape existing conditions that might be misconstrued as damage related to contractor’s activity. File with Project Manager prior to start of work.
14.7 No utility services are to be interrupted without the consent of the University. Contractor shall protect any known utilities against damage during construction. This includes but not limited to fire, water, gas, communications, and electricity.

15. Facilities Usage
15.1 Owner will determine a use of toilet facilities per contract (See Special Conditions). If contractor is required to provide temporary toilet facilities, they shall be in quantities necessary to adequately service workers and contractor's personnel. Portable toilets on site shall be serviced regularly and used in accordance with good, clean sanitary practice. Contractor shall obtain portable toilets from an established firm regularly providing the same.
15.2 No cleaning of tools, buckets, vehicles etc. in any facilities or on grounds without prior approval by the University.
15.3 The contractor shall provide communication devices, such as telephones, for use by their employees or subcontractors and shall not be permitted the free use of the existing EKU systems.
15.4 In the event the Owner elects to make available electric power or domestic water, at no cost, to the Contractor for construction purposes, the election to do so will be spelled out in the Special Conditions for this project. Electric power provided by the Owner, shall not be utilized as a means for temporary heat without specific approval from the Owner in writing. Contractor shall furnish all labor and devices required to convey these temporary services from point of connection to point of use desired by Contractor or his Subcontractors.

16. Occupancy
16.1 EKU will occupy adjacent buildings at areas of work. Contractor shall conduct work in a manner that will minimize need for disruption of EKU's normal operations. Contractor
shall provide minimum of 48 hours advance notice to EKU of activities
that will affect the normal operations of the building and/or area of work. Coordinate
all work with EKU, including daily work schedules and areas of work.

16.2 Any work that may impact the normal operations of the fire alarms system shall be
coordinated with EKU personnel with a minimum of a three (3) day notice.

16.3 Protect smoke detectors at all times. Any detector that gets painted, damaged,
altered, or defaced will be replaced by a certified fire alarm contractor at no
additional cost to the Owner.

17. General Work Hours
Work Hours must be agreed upon and discussed prior to bidding and will be noted in the Special
Conditions.

18. Storage and Staging
18.1 Storage and staging areas (if needed) will be as described in the Special
Conditions and will be discussed at the preconstruction meeting.

18.2 The contractor is responsible for the security of their materials and equipment.

19. Signs
The Contractor shall not display any sign, trademark, etc. except by the approval of EKU.

20. Administrative
20.1 If applicable, a preliminary construction meeting will be held at a time and place
designated by the Owner, for the purpose of identifying responsibilities of Contractor
and Owner. A date will be set at time of bid opening for the meeting.

20.1.1 Topics to be discussed include:
> Construction Schedule
> Use of areas of the site
> Delivery and storage
> Safety
> Post clean-up
> Submittals
> Change orders
> Applications for payment
> Record documents

20.1.2 Meeting attendees shall include:
> The Owner
> The Contractor and its Superintendent (All Must Be Present)
> Subcontractor representative (if applicable)
> Manufacturer representative

21. Subcontractor
21.1 Contractor Fully Responsible for Subcontractors. The contractor is fully responsible to the
Owner for the acts and omissions of his Subcontractors and of persons and entities
either directly or indirectly employed by them. Nothing contained in the Contract
Documents shall create any contractual relationship between the Owner and a
Subcontractor.

21.2 Subcontractors listed on the bid form shall not be changed without written
permission from the University.

21.3 Flow-down Requirement. By contract, the Contractor shall require each
Subcontractor:
21.3.1 to be bound to the Contractor by the terms of the Contract Documents insofar
as they apply to the Work to be performed by the Subcontractor; and
21.3.2 to assume toward the Contractor all the obligations which the Contractor, by
the Contract Documents, assumes toward the Owner.
21.4 All subcontractors are required to follow the same schedule and guidelines outlined by the contract documents.

21.5 **Contracts with Subcontractors.** The Contractor shall contract with those Subcontractors listed in the Contractors Bid Response and deemed acceptable by the Owner in accordance with the procedure outlined in the Instruction to Bidders. All subcontracts shall afford the Contractor rights against the Subcontractor which correspond to those rights afforded to the Owner against the Contractor herein, including those rights of Contract termination as set forth herein.

21.6 **Substitution of Subcontractors.** The Contractor shall not contract with any substitute Subcontractor or change a Subcontractor without providing timely written notice of the proposed substitution to the Architect, Project Engineer and Purchasing Officer. The substitution shall not be made if the Owner, Architect, Project Engineer, or Purchasing Officer object in writing to such change.

22. **Changes in the Work/Change Orders**

22.1 Change Order means a written order to the Contractor executed by the Owner and the Architect after execution of the Contract, directing a change in the Work and may include a change in the Contract Price, or the Contract Completion Time, or any combination thereof.

22.2 Any change in the Contract Sum resulting from a Change Order shall be determined by one of the following methods:

22.2.1 by mutual agreement of a lump sum amount between the Owner and the Contractor as evidenced by (a) the Change in the Contract Sum being set forth in the Change Order, (b) such change in the Contract Sum, together with any conditions or requirements relating thereto, being initialed by both parties and (c) the Contractor’s execution of the Change Order;

22.2.2 by unit prices stated in the Contract Documents or subsequently agreed upon; or

22.2.3 if no mutual agreement occurs between the Owner and the Contractor, the Change in the Contract Sum, if any, shall be derived by determining the reasonable actual costs or savings achieved resulting from revisions in the Work.

22.3 Items (22.2.1) and (22.3.3) above shall include a component for all overhead, profit, indirect costs or other items not to exceed fifteen percent (15%). Any such costs or savings shall be documented in the format, and with such content and detail as the Owner or the Architect requires. The Contractor shall only receive one fifteen percent (15%) for the “jobsite overhead and profit” component whether such work be done by the Contractor or by his Subcontractor.

22.4 For all charges relating to any Change Order, whether determined under subparagraph 22.2.1, 22.2.2 or 22.2.3 above, the following provisions shall apply:

22.4.1 The Contractor shall keep and present in such form as the Architect may direct, a correct account of all items in such form comprising the net cost of such Work, together with vouchers. The determination of the Architect shall be final upon all questions of the amount and cost of Changes in the Work, and it shall include in such cost, the cost to the Contractor of all materials used, of all labor, common and skilled, or foremen, trucks and teams, and the fair rental of all machinery used and for the period of such use. If said Work requires the use of machinery not already upon the work or to be otherwise used upon the Work, then the cost of transportation of such machinery to and from the Work shall be added to the fair rental, but
said transportation shall not cover a distance exceeding one hundred (100) miles.

22.4.2 The Architect shall not include in the net cost of Work any cost or rental or small tools, or any portion of time of the Contractor or his Superintendent, or any allowance for the use of capital, or any additional bond premium, insurance cost applicable to the Work or any actual or anticipated profit, or any job or office overhead not previously mentioned, these items being considered as being covered by the added fifteen (15%) percent for the jobsite overhead and profit component.

22.4.3 In all cases where Changes in the Work are covered by unit prices set forth in the Contract, the value of such Work shall be determined only upon the basis of such unit prices.

22.4.4 Pending final determination of value, payments on Changes in Work shall be made only upon the estimate of the Architect.

22.5 If the Contractor claims that any instructions by the Architect involve additional cost and/or time extension, he shall give the Architect written notice thereof within a reasonable time after the receipt of such instructions and before proceeding to execute the change in Work.

22.6 On all Change Orders that exceed $25,000, the Contractor shall submit the following certification:

“I (the Contractor) certify to the best of my knowledge and belief, the cost or pricing data submitted is accurate, complete and current as of the date of the proposed change.”

22.7 If the Owner and Contractor cannot agree on the effect of an ordered change on the adjustment to the Contract Sum or Contract Completion Time, this matter may also be referred to the Architect for determination.

22.8 If the Owner and/or Contractor do not agree with the Architect’s determination regarding the valuation of a change, the related adjustment to the Contract Sum or to the Contract Completion Time, the matter shall be subject to the disputes procedure set out in Article 30.

22.9 The execution of a Change Order by the Contractor shall constitute conclusive evidence of the Contractor’s agreement to the ordered changes in the Work, the resulting Contract as thus amended, the Contract Sum and the time for performance by the Contractor. The Contractor, by executing the Change Order, waives and forever releases any claim against the Owner for additional time or compensation for matters relating to or arising out of or resulting from the Work included within or affected by the executed Change Order.

22.10 The Contractor shall notify and obtain the consent and approval of the Contractor’s Payment and Performance Bond sureties with reference to all Change Orders if such notice, consent or approval are required by the Owner, the Architect, the Contractor’s sureties or by law. The Contractor’s execution of the Change Order shall constitute the Contractor’s warranty to the Owner that the sureties have been notified of, and consent to, such Change Order and the sureties shall be conclusively deemed to have been notified of such Change Order and to have expressly consented thereto.

22.11 Minor Changes. The Architect may authorize minor changes in the Work which do not involve additional cost or extension of the Contract Completion Time, and which are not inconsistent with the intent of the Contract Documents. Such changes shall be effected by a Field Order issued by the Architect, which shall be
binding on the Owner and Contractor. The Contractor shall carry out such orders promptly. However, if the Contractor claims that a Field Order involves additional cost or a delay to completion of the Work, he shall give the Architect written notice thereof within a reasonable time after receipt of the Field Order. Otherwise, he shall be deemed to have waived any right to claim an adjustment to the Contract Sum or to the Contract Completion Time.

23. **Key Checkout Procedure**

Keys will be issued upon approval by Capital Construction and Project Administration or Facilities Services. Unless prior approval is granted by the director of Capital Construction and Project Administration or Facilities Services, all keys must be signed in and out daily. If prior approval is granted to keep a key for the duration of a project, the key must be returned at the end of the project. Master and series sub-master keys will only be provided if the scope of the project requires the key. Contractors are responsible for all the expenses created by lost or misused keys.

24. **Site Visit**

All Contractors, before submitting bids, shall visit and examine the site as necessary to satisfy themselves as to the nature and scope of required work, including any and all dimensional measurements, and any difficulties attending the execution of the work as hereinafter specified and as indicated on the drawings. The submission of a bid will be construed as evidence that a visit and examination has been made. Later claims for labor, equipment, or materials required or difficulties encountered which could have been foreseen had such an examination been made, will not be recognized. No consideration will be given to any claim based on lack of knowledge of existing conditions.

25. **Measurements**

Each Contractor shall be responsible for verification of all measurements and dimensions at the site before ordering any materials or doing any work. No extra compensation shall be allowed due to difference in actual dimensions and measured dimensions. NOTE: DO NOT SCALE THE DRAWINGS. EKU will not be responsible for deviations in drawing measurements, even if listed on a drawing provided by EKU.

26. **Labor and Materials**

26.1 Unless otherwise stipulated, the Contractor shall provide and pay for all materials, supervision, labor, water, tools, equipment, light, power, temporary heat, hoist, supplies, appliances, transportation, and other facilities and things necessary for the execution and completion of the Work. In the event the Owner elects to make available the electric power, at no cost, to the Contractor for construction purposes, it shall not be utilized as a means for temporary heat.

26.2 **Contractor Warranty.** The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will strictly conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor’s warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

26.3 If an “or equal” is submitted, other than a product specified within these contract
documents, the Contractor shall submit general product data at the time of bid opening. These documents will not be accepted at a later date. Not submitting such shall indicate that all items bid are “as specified.”

26.4 Unless otherwise noted in the contract documents, EKU will not furnish any materials, labor, equipment or services to the Contractor for completion of the work.

26.5 Substitution-Materials and Equipment. Substitution of previously approved equipment and materials shall be considered only for the following reasons:
   29.5.1 Unavailability of the material or equipment due to the conditions beyond the control of the Contractor;
   29.5.2 Inability of the supplier to meet Contract schedule; or
   29.5.3 Technical and immaterial noncompliance to specifications.

26.6 Inclusion of a certain make or type of materials or equipment by the Contractor shall not obligate the Owner to accept such material or equipment if it does not meet the requirements of the plans and specifications. Substitutions not properly approved and authorized may be considered defective work. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials and equipment.

26.7 The Owner shall not and will not be responsible for accepting, unloading and/or storing any material delivered to the site.

27. Indemnification
   The Contractor shall indemnify and hold the Owner harmless from any and all claims, liability, damage, loss, cost and expense of every type whatsoever, regardless of whether such liability, claim, damage, loss, cost or expense is caused in part by the Owner, including, without limitation, attorneys’ fees and expenses, in connection with the Contractor’s performance of this Contract, provided that such claims, liability, damage, loss, cost or expense is due to sickness, personal injury, disease or death, or to loss or destruction of tangible property (other than the Work itself), including loss of use resulting therefrom, to the extent caused by the Contractor, or anyone for whose acts the Contractor may be liable.

28. Insurance
   28.1 The Contractor is required to provide proof of insurance coverage prior to beginning contracted work. Contractor must keep current certificates on file with owner until contract work is completed. Contractor must also provide copies of complete insurance policy of required insurance upon the Owner’s request.

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

28.3 Minimum Scope of Insurance:
   >Insurance Services Officer commercial general liability coverage (“occurrence” Form CG 0001, Ed. 10/93)
   >Insurance Services Office Form CA 0001 (Ed. 12/93) covering automobile liability, Code 1 “any auto”
   >Workers’ compensation insurance as required by the Workers’ Compensation Act (as contained in KRS Chapter 342) and employers liability insurance

28.4 Minimum Limits of Insurance:
   >Refer to the instructions in the Purchasing Instructions to Bidders for the specific project.

28.5 Other Insurance Provisions: The policies are to contain, or be endorsed to contain, the following provisions:
Commercial General Liability and Automobile Liability Coverages Owner, its officers and employees are to be covered as insureds as respects liability arising out of activities performed by or on behalf of the Contractor; general supervision of the work by Owner; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor, or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to Owner, its officers or employees.

The Contractor’s insurance coverage shall be primary insurance as respects Owner, its officers and employees. Any insurance of self-insurance maintained by Owner shall be excess of the Contractor’s insurance and shall not contribute to it.

Any failure to comply with reporting provisions of the policies shall not affect coverage provided to Owner, its officers or employees.

The Contractor’s insurance shall apply separately to each insured against whom claim is made or suit is brought except with respect to the limits of the insurer’s liability.

All Coverages. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days’ prior written notice by certified mail, return receipt requested, has been given to Owner.

28.6 Acceptability of Insurers Insurance. Insurance is to be placed with insurers with an A.M. Best’s rating of no less than A VII, authorized to write insurance in the Commonwealth of Kentucky.

28.7 Verification of Coverage. The Contractor shall furnish the Owner with certificates evidencing the required insurance coverage prior to commencing work. Contractor shall keep up-to-date copies of such certificates on file with Owner until work is completed. Owner may require Contractor to submit policy endorsements or complete policy copies of the required insurance.

28.8 Subcontractors. Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

28.9 The Contractor shall provide all Risks Insurance in an amount of not less than one hundred percent (100%) of the insurable value of all the work. The coverage, is to be written on CP 00 20 06 95 or equivalent acceptable to the University. All coinsurance clauses in the Risks Insurance policy will be waived. All rights of subrogation against the Owner (i.e. the University) will be waived by the insurer. Such insurance shall be for the benefit of the Contractor, Owner and any Subcontractor engaged on this project, as the Owner shall find their respective interest may appear. The Risks Insurance must be dated and in force on the date indicated in the Contract to begin work.

28.10 The insurance coverage required by the Contract Documents shall be in compliance with the laws of the Commonwealth of Kentucky and shall be placed with a licensed resident or non-resident agent who represents insurance companies authorized to do business in Kentucky.

28.11 The Certificate of Insurance or Certificates of Insurance will have the following endorsements as an attachment to the Certificate or Certificate’s:

28.11.1 Eastern Kentucky University, Division of Capital Construction and Project Administration will be named as an additional insured.
28.11.2 The policy is primary coverage and any insurance or self-insurance maintained by the University shall be excess.

28.11.3 Any failure of the named insured to comply with the reporting provisions of the policy shall not affect coverage provided to the University, its officers or employees.

28.11.4 All Coverages. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party, reduced in coverage or in limits except after thirty (30) days’ prior written notice by certified mail, return receipt requested, has been given to Owner.

29. Performance and Payment Bonds

29.1 The Contractor shall furnish separate performance and payment bonds to the Owner. The Contractor shall furnish a performance bond satisfactory to the Owner in an amount equal to one hundred percent (100%) of the Contract Sum as security for the faithful performance of the Contract. The Contractor shall also furnish a payment bond satisfactory to the Owner in an amount equal to one hundred percent (100%) of the Contract Sum for the protection of all persons performing labor or furnishing materials, equipment or supplies for the Contractor or his Subcontractor for the performance of the Work provided for in the Contract, including security for payment of all unemployment contributions which become due and payable under Kentucky Unemployment Insurance Law.

29.2 Each bond furnished by the Contractor shall incorporate by reference the terms of the Contract as fully as though they were set forth verbatim in such bonds. In the event the Contract Sum is adjusted by Change Order executed by the Contractor, the penal sum of both the performance bond and the payment bond shall be deemed increased by like amount.

29.3 The performance and payment bonds shall be executed by a surety company authorized to do business in this Commonwealth, and the contract instrument of bonds must be countersigned by a duly appointed and licensed resident agent.

30. Claims by the Contractor/Concealed Conditions/Disputes

30.1 Claims by the Contractor against the Owner are subject to the following:

30.1.1 All Contractor claims against the Owner shall be initiated by a written claim submitted to the Owner and the Architect. Such claim shall be filed with the Owner and the Architect no later than seven (7) calendar days after the event, or the first appearance of the circumstances, causing the claim, and same shall set forth in detail all known facts and circumstances supporting the claim;

30.1.2 The Contractor and the Owner shall continue their performance regardless of the existence of any claims submitted by the Contractor.

30.1.3 In the event the Contractor discovers previously concealed and unknown site conditions which differ materially from those indicated in the Contract Documents, or unknown site conditions which are materially at variance from those typically and ordinarily encountered in the general geographical location of the Project, the Contract Sum shall be modified, either upward or downward, upon the written claim made by either party within seven (7) calendar days after the first appearance to such party of the circumstances. As a condition precedent to the Owner having any liability to the Contractor due to concealed and unknown conditions, the Contractor must give the
Owner and the Architect written notice of, and an opportunity to observe, such condition prior to disturbing it. The failure by the Contractor to give the written notice and make the claim as provided by this paragraph shall constitute a waiver by the Contractor of any rights arising out of or relating to such concealed and unknown condition;

30.1.4 In the event the Contractor seeks to make a claim for an increase in the Contract Sum, as a condition precedent to any liability of the Owner therefor, the Contractor shall strictly comply with the requirements of the first paragraph of this Article and such claim shall be made by the Contractor before proceeding to execute any additional or changed Work. Failure of the condition precedent to occur shall constitute a waiver by the Contractor of any claim for additional compensation;

30.1.5 In connection with any claim by the Contractor against the Owner for compensation in excess of the Contract Sum, any liability of the Owner for the Contractor’s cost shall be strictly limited to direct cost incurred by the Contractor and shall in no event include indirect cost or consequential damages of the Contractor.

30.1.6 The Owner shall not be liable to the Contractor for claims of third-parties including subcontractors, unless and until liability of the Contractor has been established therefor in a court of competent jurisdiction;

30.2 In the event the Contractor should be delayed in performing any task which at the time of the delay is then critical, or which during the delay becomes critical, as the sole result of any act or omission by the Owner or someone acting in the Owner’s behalf, or by Owner-authorized Change Orders, unusually bad weather not reasonably anticipatable, fire or other Acts of God, the date for achieving Substantial Completion, or, as applicable, final completion, shall be appropriately adjusted by the Owner upon the written claim of the Contractor to the Owner and the Architect. An extension of time shall not mean that the Contractor is entitled to additional compensation. A task is critical within the meaning of this paragraph if, and only if, said task is on the critical path of the Project schedule so that a delay in performing such task will delay the ultimate completion of the Project. Any claim for an extension of time by the Contractor shall strictly comply with the requirements of the first paragraph of this Article above. If the Contractor fails to make such claim as required in this paragraph, any claim for an extension of time shall be waived.

30.3 All claims under this Contract shall be made in accordance with KRS 45A.225 to 45A.290. The provisions of these statutes do not toll the running of the Statute of Limitations set forth in KRS 45A.260. Any suit pursuant to KRS 45A.245 shall be commenced within one (1) year of the Substantial Completion Date specified in the Contract. If the Contractor does not commence suit within one (1) year of the date specified in the Contract, the Contractor shall be foreclosed from proceeding in court pursuant to KRS 45A.245.

30.4 The Owner and Contractor agree that any suit, action or proceeding with respect to this Contract may only be brought in or entered by the courts of the Commonwealth of Kentucky situated in Frankfort, Franklin County, Kentucky, or the United States District Court for the Eastern District of Kentucky, Frankfort Division, and the parties hereby submit to the non-exclusive jurisdiction of such courts for the purpose of any such suit, action, proceeding or judgment and waive any other preferential jurisdiction by reason of domicile or location. The parties hereby agree that any such legal action shall
be tried by the court sitting without a jury. The parties hereby irrevocably waive any objection that they may now or hereafter have to the laying of venue of any suit, action or proceeding arising out of or related to this Contract brought in the courts of the

31. Liens
Commonwealth of Kentucky situated in Frankfort, Franklin County, Kentucky, or the United States District Court for the Eastern District of Kentucky, Frankfort Division, and also hereby irrevocably waive any claim that any such suit, action or proceeding brought in any one of the above-described courts has been brought in an inconvenient forum.

31.1 The filing and perfection of liens for labor, materials, supplies and rental equipment supplied on the work are governed by KRS 376.195 to 376.260.

31.2 The lien shall attach only to any unpaid balance or retainage due the Contractor for the improvement from the time a copy of statement of lien, attested by the County Clerk, is delivered to the Owner, pursuant to the provisions of KRS 376.240. Statements of lien shall be filed with the Madison County Clerk and action to enforce the same must be instituted in the Madison Circuit Court, Richmond, Kentucky, pursuant to KRS 376.250(2).

32. Assignments
Neither party to the Contract shall assign the Contract, or any portion thereof without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him hereunder without notification to the Owner. Notification of Assignments, shall be given in accordance with the procedures and regulations of Eastern Kentucky University.

33. Separate Contracts

33.1 Owner’s Right to Perform Construction and to Award Separate Contracts. The Owner reserves the right to let other contracts in connection with the Project or to perform Work with its own forces. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work and shall properly connect and coordinate his Work with theirs.

33.2 If any part of the Contractor’s Work depends for proper execution or results upon the Work of any other contractor, the Contractor shall promptly report to the Architect any observed defects in such Work that render it unsuitable for proper execution or connection. His failure to inspect and report shall constitute an acceptance of the other contractor’s Work as fit and proper for the reception of his Work, except as to defects which may develop in the other contractor’s Work after the execution of his Work.

33.3 Whenever Work being done by the Owner’s forces or by other contractors is contiguous to Work covered by this Contract, the respective rights of the various interests involved shall be established by the Architect to secure the completion of the various portions of the Work in general harmony.

33.4 Mutual Responsibility of Contractors. Should the Contractor cause damage to any separate contractor on the Work, the Contractor agrees, upon due notice, to settle with such contractor if he will so settle. If such separate contractor sues the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor who shall defend such proceedings at the Contractor’s expense and if any judgment against the Owner arises therefrom, the Contractor shall pay or satisfy it and pay all costs incurred by the Owner.

34. Cash Allowances
The Contractor shall have included in the Contract Sum all allowances stated in the Contract Documents and shall cause the Work so designated to be done as the Owner may direct. If the actual price for purchasing the “allowed material” is more or less than the “cash allowance,” the Contract Sum shall be adjusted accordingly. The adjustment in Contract Sum shall be made on the basis of the purchase price without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the “allowed materials” shall be included in the applicable
sections of the Contract specifications covering this Work.

35. Schedules

35.1 The Contractor, within fifteen (15) days of the Date of Commencement shall prepare and submit for the Owner and Architect’s approval a construction schedule for completing the Work. The schedule shall indicate the starting and completion dates of the various stages of the Work, shall not exceed time limits established by the Contract Documents for the various stages of Work, shall be updated monthly and furnished to the Owner and Architect, shall be related to the Work of any other contractors on the Project to the extent required by the circumstances, and shall provide for expeditious and practicable execution of the Work. The original schedule shall be accompanied by a proposed schedule of values as described in Article 39.1. The Contractor shall promptly notify the Architect and Owner if the Contractor is materially ahead of, or behind the updated construction schedule. Failure to so notify the Architect and Owner shall relieve the Owner from liability for damages caused by delay or impact. Strict compliance with the requirements of this paragraph shall be a condition precedent to payment to the Contractor, and failure by the Contractor to strictly comply with said requirements shall constitute a material breach of the Contract.

35.2 For projects with a contract amount of $1,000,000 or greater the schedule shall be in critical path method (CPM) format. The schedules shall include all activities necessary for performance of the work showing logic (sequences, dependencies, etc.) duration of each activity with the critical path highlighted. The schedules shall include, but not be limited to, submittal processing, fabrication and delivery of materials, construction, testing clean-up, work and/or materials to be provided by the Owner, dates and durations for major utility outages requiring coordination with the Owner and the Owner’s operations, and significant milestones related to the completion of the Project.

35.3 The Contractor acknowledges that all floats (including Total Float, Free Float, and Sequestered Float) are shared commodities available to the Project and are not for the exclusive benefit of any party; floats are expiring resources available to accommodate changes in the Work, however originated, or to mitigate the effect of events that may delay performance or completion of all or part of the Work.

36. Delays and Extensions of Time

36.1 It is agreed that time is of the essence for each and every portion of the resulting Contract and where under the Contract an additional time is allowed for the completion of any Work, the new time limit fixed by such extension shall be of the essence of the Contract. Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the Work is due to:

36.1.1 any preference, priority, or allocation order duly issued by the government;

36.1.2 unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; or

36.1.3 any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections 36.1.1 and 36.1.2 of this Article.

36.2 The Contractor shall, within fifteen (15) calendar days of the occurrence of the event, notify the Architect in writing. The Architect shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter. Any change in the Contract Completion Time resulting from any such claim shall be incorporated in a Change Order. An extension of time shall not be construed as cause for extra compensation under the Contract. Extensions of time relating to concealed conditions as defined in Article 30 shall be governed by the provisions of that Article.

37. Shop Drawings; Submittals

37.1 Schedule of Submittals. Prior to submission of the first application for payment and in sufficient time to allow the Architect reasonable time for review, the Contractor shall submit to the Architect a schedule of submittals which shall be coordinated
with the construction schedule. The Contractor shall keep the schedule of submittals current.

37.2 Submittals of Shop Drawings, Samples, etc. The Contractor shall review, approve, and submit Shop Drawings, samples, and product data in accordance with the approved schedule as herein detailed. The Contractor’s stamp of approval on any Shop Drawing or sample shall constitute a representation to Owner and Architect that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the Work and the Contract Documents.

37.3 The Architect shall review and approve, with reasonable promptness, the Shop Drawings, or return for corrections as required. The review and approval shall be for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The approval of a separate item will not indicate approval of the assembly in which the item functions.

37.4 The Contractor shall make any corrections required by the Architect for compliance to the Contract and shall return the required number of corrected copies of Shop Drawings and resubmit new samples until approved. The Contractor shall direct specific attention, in writing, or on resubmitted Shop Drawings, to revisions other than the corrections called for by the Architect on previous submissions.

37.5 Where a Shop Drawing or sample submission is required by the specifications, no related work shall be commenced until the submission has been approved by the Architect. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Architect.

37.6 The Architect’s approval of Shop Drawings or samples shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless the Contractor has in writing called the Architect’s attention to such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall any approval by the Architect relieve the Contractor from responsibility for errors or omissions in the Shop Drawings.

37.7 The Contractor shall maintain a submittal log which shall include, at a minimum, the date of each submittal, the date of any resubmittal, the date of any approval or rejection, and the reason for any approval or rejection.

38. Supervision and Construction Procedures

38.1 Supervision of the Work. The Contractor shall supervise and direct the Work, using the Contractor’s best skill and attention so as to ensure expeditious, workmanlike performance in accordance with the requirements of the Contract Documents. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures. He shall be responsible for the acts and omissions of persons directly employed by him, as he is for Subcontractors and others under Article 21. He shall be responsible for coordinating all portions of the Work under the Contract unless the Contract Documents give other specific instructions concerning these matters.

38.2 Obligations to Follow Contract Requirements. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents by the activities or duties of the Architect in the Architect’s administration of the Contract or by tests, inspections or approvals required or performed by persons other than the Contractor.

38.3 The Contractor shall not perform Work without adequate plans and specifications, or, as appropriate, approved Shop Drawings, or other submittals. If the Contractor performs Work knowing or believing it involves an error, inconsistency or omission without first providing written notice to the Architect and Owner, the Contractor shall be responsible for such Work and pay the cost of correcting same.

38.4 All work shall strictly conform to the requirements of the Contract Documents.

38.5 The Work shall be continually supervised, the Contractor bearing full responsibility for any and all acts or omissions of those engaged in the Work on behalf of the
Contractor.

38.6 The Contractor shall at all times enforce strict discipline and good order among his employees and Subcontractors and shall not employ in the Work any person not skilled in the Work assigned to him.

38.7 The Contractor shall employ and maintain at the Project site only competent supervisory personnel.

38.8 The Contractor shall have a continuing duty to read, examine, review, compare and contrast each of the Contract Documents, Shop Drawings, and other submittals and shall give written notice to the Owner and the Architect of any potential conflict, ambiguity, error or omission which the Contractor may find with respect to these documents and their adequacy and sufficiency for construction as required by the Contract before proceeding with the affected Work. The express or implied approval by the Owner or the Architect of any Shop Drawings or other submittals shall not relieve the Contractor of the continuing duties imposed hereby, nor shall any such approval be evidence of the Contractor’s compliance with the resulting Contract. The Owner has relied upon the Architect to prepare documents for the Project, including the plans and specifications for the Project, which are accurate, adequate, consistent, coordinated and sufficient for construction, and in issuing the Contract to the Contractor, the Owner’s established legal duties to the Contractor notwithstanding, the Owner has relied upon the Architect’s professional expertise in fulfilling its legal duty to the Owner in addition to the Contractor’s full and good faith compliance with its duties set forth above.

38.9 Superintendent. The Contractor shall employ a qualified, competent superintendent and any necessary assistants who shall be in attendance at the Project site during performance of the Work. The University reserves the right to approve the Superintendent selected by the Contractor. The superintendent shall have full authority to act in behalf of the Contractor and all instructions given to them.

39. Payment
The superintendent shall be considered as given to the Contractor. It shall be the responsibility of the Contractor’s superintendent to coordinate the work of all the Subcontractors.

The superintendent shall not be changed except under the following circumstances:

38.9.1 where the superintendent proves to be unsatisfactory to the Contractor or ceases to be in his employ, in which case the Contractor shall give timely prior written notice to the Owner of the impending change in superintendent and a reasonable explanation for the change; or

38.9.2 where the Owner has reasonable grounds for dissatisfaction with the performance of the superintendent and gives written notice to the Contractor of these grounds. The Contractor, upon receiving such written notice, shall replace the existing superintendent with a successor, to whom the Owner has no objection.

The Owner shall make payments, less retainage, to the Contractor on the amount of the Work performed or materials furnished for the Work in accordance with the following procedures:

39.1 Schedule of Values. At the same time it submits a construction schedule, within fifteen (15) days of the Date of Commencement, as provided in Article 35, the Contractor shall submit a Schedule of Values apportioning the Contract Sum among the different elements of the Project for purposes of periodic and final payment, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. The Contractor shall not imbalance its Schedule of Values, nor artificially inflate any element thereof. The violation of this provision by the Contractor shall constitute a material breach of the Contract. Upon written approval by the Architect and the Owner, the Schedule of Values and construction schedule shall become the basis for the Contractor’s Payment Requests during construction.

39.2 Application for Progress Payment. Not more often than once a month, the Contractor shall submit to the Architect a signed application for payment (sometimes referred to as Payment Request), for the Work completed as of the date of the application and
accompanied by such data and schedules as the Architect may reasonably require. Therein, the Contractor may request payment less retainage for that part of the Contract Sum allocable to Contract requirements properly provided, labor, materials and equipment properly incorporated in the Project. If payment is requested on the basis of materials and equipment not incorporated in the Project, but delivered and suitably stored at the Project site or at another location agreed to in writing by the Owner, the application for payments shall also be accompanied by such data, satisfactory to Owner, as will establish the Owner’s title to the material and equipment and protect his interest therein, including written documentation of full insurance against loss or damage and the bonding of the storage sites. Storage sites must be bonded.

Each subsequent application for payment shall include an affidavit of the Contractor stating that all previous progress payments received on account of the Work have been applied to discharge in full all of the Contractor’s obligations reflected in prior applications for payment. Each Payment Request shall be signed by the Contractor and shall constitute the Contractor’s representation that the quantity of Work has reach the level for which payment is requested, that the Work has been properly installed or performed in strict compliance with this Contract, and that the Contractor knows of no reason why payment should not be made as requested.

39.3 Approval of Payments. The Architect shall review the application for payment and shall review the Work at the project site or elsewhere to determine whether the quantity and quality of the Work is as represented in the application for payment and is as required by this Contract. The Architect shall, within ten (10) business days after receipt of each application for payment, approve in writing the amount which, in the opinion of the Architect, is properly owing to the Contractor. The Owner shall make payment to the Contractor within twenty (20) business days following the Architect’s written approval of each application for payment. A reasonable delay on the part of the Owner in making payment to the Contractor for any given payment shall not be a breach of contract. The amount of each such payment shall be the amount approved for payment by the Architect less such amounts, if any, otherwise owing by the Contractor to the Owner or which the Owner shall have the right to withhold as authorized by this Contract. The Architect’s approval of the Contractor’s application for payment shall not preclude the Owner from the exercise of any of its rights as set forth herein. The Contractor warrants and represents that, upon payment of the application for payment, title to all Work included in such payment shall be vested in the Owner.

39.4 Contractor’s Warranty of Title. The Contractor warrants and guarantees that title to all Work, materials and equipment covered by any application for payment, whether incorporated in the project or not, will pass to Owner at the time of payment free and clear of all encumbrance.

39.5 Retainage Reduction. Until fifty percent (50%) of the construction work has been completed in accordance with the contract, the Owner may withhold no more than ten percent (10%) retainage from the amount of any undisputed payment due, and retainage held after fifty-one percent (51%) of the construction project has been completed shall not be more than five percent (5%) of the total contract amount.

39.6 Completion, Acceptance, and Final Payment. Upon certification by the Architect of Substantial Completion of the Work, the Contractor shall continue to make normal pay requests as defined within this document. Within thirty (30) days after substantial completion, the Owner shall release the retainage less an amount equal to two hundred percent (200%) of the Owner’s reasonably estimated cost of the balance of any contractor’s contractually obligated, yet uncompleted, work remaining.

39.7 Final payment, shall be made by the Owner to the Contractor when the Contract has been fully performed by the Contractor in accordance with the Contract Documents and a final Certificate of Payment is issued by the Architect. Such final payment shall be made by the Owner not more than thirty (30) business days after the issuance of the final Certificate of Payment. The Contractor shall submit with the application for final payment an affidavit that all payrolls, bills for materials, supplies and equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied,
along with such supporting evidence of payment as the Architect requires. Final payment is conditioned on satisfactory compliance with this requirement.

39.8 Waiver of Claims. The making of final payment shall constitute a waiver of all claims by the Owner except those arising from:
> unsettled liens;
> faulty or defective Work appearing after Substantial Completion;
> failure of the Work to comply with the requirements of the Contract Documents; or
> terms of any special warranties required by the Contract Documents.

39.9 The acceptance of final payment by the Contractor shall constitute a waiver of all claims except those previously made in writing and identified by the Contractor as unsettled at the time of the final application for payment.

39.10 Contractor’s Payment to Subcontractors. When payment is received from the Owner, the Contractor shall immediately pay all Subcontractors, materialmen, laborers, and suppliers the amounts they are due for the Work covered by such payment. In the event the Owner becomes informed that the Contractor has not paid a Subcontractor, materialman, laborer, or supplier as provided herein, the Owner shall have the right, but not the duty, to issue future checks and payment to the Contractor of amounts otherwise due hereunder naming the Contractor and any such Subcontractor, materialman, laborer, or supplier as joint payees. Such joint check procedure, if employed by the Owner, shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit the Owner to repeat the procedure in the future. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payment to his subcontractors in similar manner.

39.11 The Architect may, on request, furnish to any Subcontractor information regarding the percentage of completion of the amounts applied for by the Contractor and the action thereon by the Architect.

39.12 Neither the Owner nor the Architect shall have any obligation to make payment to any Subcontractor except as may otherwise be required by law.

39.13 Owner’s Rights Relating to Payments. Neither payment to the Contractor, utilization of the project for any purpose by the Owner, nor any act or omission by the Owner shall be interpreted or construed as an acceptance of any Work of the Contractor not strictly in compliance with this Contract.

39.14 The Owner shall have the right to refuse to make payment and, if necessary, may demand the return of a portion of all of the amount previously paid to the Contractor due to:
> The quality of a portion, or all, of the Contractor’s Work not being in accordance with the requirements of this Contract;
> The quantity of the Contractor’s Work not being as represented in the Contractor’s Payment Request, or otherwise;
> Claims made, or likely to be made, against the Owner;
> Loss caused by the Contractor;
> The Contractor’s failure or refusal to perform any of its obligations to the owner.

39.15 In the event that the Owner makes written demand upon the Contractor for amounts previously paid by the Owner as contemplated in the Paragraph, the Contractor must promptly comply with such demand.

40. Quality of Work

40.1 Workmen or supervisors judged by EKU to be incapable of performing their trade in a manner commensurate with quality of workmanship required by these specifications and accompanying drawings shall be immediately removed from this project when directed by EKU. Work that is not satisfactorily installed shall be removed and replaced at contractor’s expense.

40.2 The Architect shall approve, or respond otherwise as necessary concerning shop drawings or other submittals received from the Contractor. The Architect shall be authorized to refuse to accept work which is defective or otherwise fails to comply with the requirements of the Contract. If the Architect deems it appropriate, the Architect shall
be authorized to call for extra inspection or testing of the Work for compliance with requirements of the Contract. The Architect shall review the Contractor’s Payment Requests and shall approve in writing those amounts which, in the opinion of the Architect, are properly owing to the Contractor as provided in the Contract. The Architect shall perform those inspections required by the Owner.

40.3 Materials determined by the Owner to be defective or unsuitable and not in conformance with the contract documents shall immediately be removed from the project site. Work shall cease immediately once a conflict arises. The contractor will be responsible to make corrections that are in conformance with the contract documents. Any deviations from the contract document must be approved in writing by the Owner prior to installation.

41. **Code Compliance (if applicable)**

The following codes and/or Standards, but not limited to, are to be adhered to during this project. Contractor shall comply with all codes to local jurisdiction.

> Kentucky Building Code
> National Electrical Code
> Occupational Safety and Health Administration
> Environmental Protection Agency
> State fire Marshals Code
> National Fire Protection Association
> Underwriters Laboratories

42. **Inspection, Tests, Permits, and License Fees**

42.1 Inspection fees by other agencies and responsibility for payment should be discussed prior to bid submission. If prior arrangements are not made, the contractor will be held accountable for all fees.

42.2 Tests of the materials, products, and equipment in place, required by the Owner or Architect, to prove quality standards shall be paid by the Contractor. If the results of testing indicate that construction is not in compliance with contract documents, the Contractor is responsible for the cost of any additional tests of materials, products, or equipment. The Contractor shall give timely notice of readiness of the work for all inspections, tests, or approvals.

42.3 Regulatory agencies of the government having jurisdiction may require any work to be inspected, tested, or approved. The Contractor shall assume full responsibility therefore, including related costs, unless otherwise noted in the contract. The Contractor shall provide the Owner and Architect the required certifications of inspection, testing, or approval.

42.4 Any delays by governmental agencies in obtaining permits, notices, required regulatory tests, and inspections that are not at the fault of either of the parties shall be shared by the Contractor and the Owner with appropriate time extensions. Liquidated damages and Contractor compensation for such delays or impact are not applicable and shall not be payable.

42.5 Building, sewer, and water permits and similar kinds of permits required by local ordinances shall be obtained by the Contractor. The Contractor is responsible for the payment of any fees associated with these permits.

42.6 The contractor shall pay all royalties and license fees that may be required to complete a project. The contractor is also responsible to defend all claims or suits for the infringement of any patent rights, and shall save the Owner harmless from loss on account thereof.

43. **Correction of Work**

43.1 Prior to the final payment, the Contractor shall promptly correct work which is rejected by the Owner or Architect as failing to conform to the requirements of the Contract Documents. Such correction shall be required regardless of whether or not the nonconformities are observed before or after Substantial Completion, or whether or not the Work has been fully fabricated.

43.2 After the final payment is received, the Contractor is still responsible for correcting any work that fails to conform to the requirements of the contract documents. If within one
year after the date of Substantial Completion of the work, or after the date for commencement of warranties, or by terms of an applicable special warranty required by the contract documents, any of the Work is found to be not in accordance with the requirements of the contract documents, the Contractor shall correct is promptly after receipt of written notice from the owner to do so unless the owner has previously given the contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of work first performed after substantial completion by the period of time between substantial completion and the actual performance of the work.

43.3 In addition to correcting all nonconforming work and removing all nonconforming work or materials from the jobsite, the Contractor is responsible for all other costs of bringing the affected work into compliance with the contract documents. This includes costs of any additional required testing or inspection services, Architect’s or Engineer’s services, and any resulting damages to property.

43.4 Even after the Contractor is no longer specifically obligated to perform corrective work itself, the Contractor shall still be held liable for nonconforming work and for other breaches of his obligations under the contract documents.

43.5 If the Contractor fails to correct the nonconforming work within a reasonable time, the Owner may take the appropriate step to correct the work itself. If within ten (10) days after receiving written notice to correct a nonconformity, the Contractor has not made suitable arrangements, the Owner may proceed to correct the nonconforming work. In such cases a Change Order shall be issued by the Owner with the approval of the Architect/Engineer with a reasonable deduction from the contract sum due to the need to correct nonconforming work. The amount difference of the Change Order will be deducted from the remaining payments to the Contractor.

43.6 If the Owner deems it impractical to correct work which is not in accordance to the requirements in the contract documents, a Change Order shall be issued by the Owner with the approval of the Architect/Engineer with a reasonable deduction from the contract sum due to the incorrect work. The amount of the Change Order will be deducted from the remaining payments to the Contractor.

43.7 *Ongoing liability of Contractor for defective work.* The foregoing provisions establishing the specific obligation of the Contractor to perform corrective work do not establish a period of limitations on other obligations of the Contractor under the contract documents.

44. *Suspension of Work*

44.1 *Suspension by the Owner.* The Owner shall have the right at any time to direct the contractor to suspend its performance, or any portion thereof for a period of not more than thirty (30) calendar days. The notice of suspension shall be in writing and shall set forth the reason for the suspension. The written notice shall fix the approximate date on which Work is contemplated to be resumed. The Owner shall pay the Contractor as full compensation for such suspension the Contractor’s Direct Job Expenses.

44.2 *Other Suspension.* In the event the Owner should be prevented or enjoined by court order from proceeding with the Work or from authorizing its prosecution, either before or after the award, for a period up to ninety (90) days, the delay shall not constitute cause for termination by the Contractor and the Contractor shall not be entitled to make or assert claim for damage by reason of said delay, but time for completion of Work shall be extended to such reasonable time as the Owner may determine will compensate for time lost by such delay. Such determination shall be set forth in a Change Order shall be final and binding upon both parties, and shall not require the signature of the Contractor to be ineffect.

44.3 The Owner shall pay the Contractor as full compensation for such suspension the Contractor’s reasonable costs actually incurred and paid as follows:

44.3.1 Demobilization and remobilization, including such costs paid to subcontractors;

44.3.2 Preserving and protecting work in place;
44.3.3 Storage of materials or equipment purchased for the Project, including insurance thereon;

44.3.4 Performing in a later, or during a longer, time frame than contemplated by this contract.

44.4 Suspension by the Contractor. If, through no act or fault of the Contractor, the Work is suspended for a period of more than thirty (30) days by the Owner, or more than ninety (90) days under an Order of the Court or other public authority, then the Contractor may, after ten (10) days from delivery of a written notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for all Work executed and reasonable expenses sustained. If the Architect has failed to act on a request for payment within thirty (30) days of submission or if the Owner has failed to make any payment within forty-five (45) working days or receipt of an approval application for payment, the Contractor may, upon ten (10) days written notice to the owner and the Architect stop the work until he has been paid all amounts due. In this incidence and upon resumption of the work, a Change Order shall be issued adjusting the contract price or extending the contract completion time, or both to compensate the costs and delays attributable to stopping the work. Any such compensation is subject to the provisions, conditions and limitations outlined in Article 30.

45. Termination

45.1 Termination of Contract for Convenience of Owner. The Owner, for any reason whatsoever, may terminate the Contract for its own convenience when it determines that such termination will be in the best interest of the University. The Owner shall give written notice of such termination to the Contractor specifying when termination becomes effective. The Contractor shall incur no further obligations in connection with the Work and the Contractor shall stop Work when such termination becomes effective. The Contractor shall also terminate outstanding orders and subcontracts. The Contractor shall settle the liabilities and claims arising out of the termination of Subcontracts and orders. The Owner may direct the Contractor to assign the Contractor's right, title and interest under termination orders or subcontracts to the Owner or its designee. The Contractor shall transfer title and deliver to the Owner such completed or partially completed Work and materials, equipment, parts, fixtures, information and Contract rights as the Contractor has. The University shall negotiate a fair and just settlement with the Contractor in accordance with 200 KAR 5:312 Section 2. In such event, the following procedure shall be required:

45.1.1 The Contractor shall submit a termination claim to the Owner and the Architect specifying the amounts due because of the termination for convenience together with costs, pricing or other data required by the Owner or the Architect. If the Contractor fails to file a termination claim within one (1) year from the effective date of termination, the Owner shall pay the Contractor, an amount derived in accordance with paragraph (45.1.3) below;

45.1.2 The Owner and the Contractor may agree to the compensation, if any, due to the Contractor hereunder pursuant to 200 KAR 5:312 Section 2;

45.1.3 Absent agreement to the amount due to the Contractor, the Owners shall pay the Contractor the following amounts:

45.1.3.1 Contract prices for labor, materials, equipment and other services accepted under this Contract;

45.1.3.2 Reasonable costs incurred in preparing to perform and in performing the terminated portion of the Work and in terminating the Contractor's performance, plus a fair and reasonable allowance for direct jobsite overhead and profit thereon (such profit shall not include anticipated profit or consequential damages); provided however, that if it appears that the Contractor would have not profited or would have sustained a loss if the entire Contract would have been completed, no profit shall be allowed or included and the amount of compensation shall be reduced to reflect the anticipated rate of loss, if any;
45.1.3.3 Reasonable costs of settling and paying claims arising out of the termination of subcontracts or orders pursuant to the initial Paragraph of 45.1. These costs shall not include amounts paid in accordance with other provisions hereof. The total sum to be paid the Contractor under 45.1 shall not exceed the total Contract Sum, as properly adjusted, reduced by the amount of payments otherwise made, and shall in no event include duplication of payment.

45.2 Termination of Contract for Cause If the Contractor should be adjudged as bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency or, if the Contractor does not perform the Work, or any part thereof, in a timely manner, supply adequate labor, supervisory personnel or proper equipment or materials, or if it fails to timely discharge its obligations for labor, equipment and materials, or proceeds to disobey applicable law, or otherwise commits a violation of a material provision of the resulting Contract, then the Owner, in addition to any other rights it may have against the Contractor or others, may terminate the performance of the Contractor upon ten (10) days written notice by registered mail of declaration of default and assume possession of the Project site and of all materials and equipment at the site and may complete the Work. In such case, the Contractor shall not be paid further until the Work is complete. After final completion has been achieved, if any portion of the Contract Sum, as it may be modified hereunder, remains after the cost to the Owner of completing the Work, including all costs and expenses of every nature incurred, has been deducted by the Owner, such remainder shall belong to the Contractor. Otherwise, the Contractor shall pay and make whole the Owner for such cost. This obligation for payment shall survive the termination of the Contract. In the event the employment of the Contractor is terminated by the Owner for cause pursuant to this Paragraph 45.2 and it is subsequently determined by a Court of competent jurisdiction that such termination was without cause, such termination shall thereupon be deemed a Termination for Convenience under Paragraph 45.1, and the provisions of Paragraph 45.1 shall apply.

46. Project Completion and Record Drawings

46.1 Commencement and Completion of Work The Contractor shall begin the Work on the Date of Commencement as specified in the Contract issued by the Owner. He shall diligently and expeditiously continue the performance of the Contract to and until Substantial Completion and Final Completion of the Project. The Contractor shall accomplish the Work in accordance with the construction schedule so as to achieve Substantial Completion and Final Completion dates as defined in the Contract Documents. All time limits stated in the Contract Documents are the essence of the Contract.

46.2 Substantial Completion of the Work The Substantial Completion Date shall be that date certified by the Architect in accordance with the following procedures:

46.2.1 When the Contractor determines that Substantial Completion has been achieved, the Contractor shall notify the Owner and the Architect in writing. The notification shall be accompanied by a Contractor prepared list of those items of Work still to be completed or corrected. The failure of the Contractor to include any item or items on such list not completed or needing correction shall not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

46.2.2 The Architect shall, within a reasonable time after receipt of notification from the Contractor of Substantial Completion, make such inspection to confirm that the Work has achieved Substantial Completion.

46.2.3 Upon its confirmation that the Contractor’s work is substantially complete, the Architect shall prepare a Certificate of Substantial Completion which shall establish the Substantial Completion Date and the responsibilities between the Owner and Contractor for security, maintenance, heat, utilities and insurance, if not otherwise provided for in the Contract Documents, and a
tentative list of items to be completed or corrected, within thirty (30) calendar
days from the Substantial Completion Date. The Certificate of Substantial
Completion shall be submitted to the Owner and Contractor for their written
acceptance of the responsibilities assigned to them in the certificate.

46.2.4 All Operation and Maintenance (O&M) manuals and warranties must be
provided to the Owner before the Certificate of Substantial Completion can
be awarded.

46.2.5 If, after making the inspection, the Architect fails to find that the Contractor’s
Work has achieved Substantial Completion, he will notify the Contractor in
writing, giving the reasons therefore.

46.2.6 If the Architect through its inspection fails to find that the Contractor’s Work
has achieved Substantial Completion and is required to repeat all, or any
portion, of its, the Contractor shall bear the cost of such repeat inspections
which cost may be deducted by the Owner from any payment then or
thereafter due the Contractor.

46.2.7 The warranty on the entire project begins at Substantial Completion (upon
warranty delivery and inspection) for all components of the project regardless
of when the components (or systems, parts, pieces, equipment, etc.) were
delivered or installed.

46.3 Final Completion of the Work. The Architect, upon receipt of written notice from the
Contractor that the Work is finally complete and is ready for final inspection and
acceptance, will promptly make such inspection and when he finds the Work
completed and acceptable under the Contract Documents and the Contract fully
performed, he will so notify the Contractor in writing and promptly issue a final
Certificate of Payment to the Owner. If the Architect is unable to issue its final
Certificate of Payment and is required to repeat its final inspection of the Project, the
Contractor shall bear the cost of such repeat inspection(s), which costs may be
deducted by the Owner from the Contractor’s final payment; When the Owner accepts
and occupies a building, all operations, maintenance, utilities and insurance become
the responsibility of the Owner.

46.4 Use of Substantially Complete Portions. The Owner may use or occupy a
specified portion of the Work at any stage, provided that:

46.4.1 such use or occupancy is consented to by insurers and

46.4.2 it is authorized by public regulatory bodies having jurisdiction over the
Work;

46.4.3 prior to such use or occupation, the affected portion of the Work is jointly
inspected by the Owner, Contractor, and Architect to determine the precise
stage of completion.

46.4.4 Such possession and use shall not be deemed an acceptance of any Work
not completed in accordance with the Contract Documents.

46.5 The Contractor shall keep one copy of all Contract Documents, drawings, specifications
and shop drawings on the site, in good condition, and a qualified representative of the
Contractor and each Subcontractor shall record on these prints, from day to day as
the Work progresses, all changes and deviations from the Contract Documents. This
set will be delivered to EKU upon completion of the project. Approval of final
payments will be contingent upon compliance with these provisions.

46.6 At the completion of work the contract area shall be complete, clean and free of all
damage, dirt and other imperfections with all operable equipment functioning
properly.

46.7 The Contractor shall remove all materials, temporary barriers, services, devices, or rubbish
resulting from his work and leave the site clean to the satisfaction of EKU upon
completion of the work and before final acceptance of the job can be made.

46.8 The Contractor shall submit all warranties and guarantees requested by this
contract.

46.9 After all work is completed, EKU and in conjunction with manufacturer’s
representative (if applicable) shall make a final inspection. Any work not up to
standard shall be removed and replaced before final payment is made.

46.10 Project Records. All documents relating in any manner whatsoever to the Project, or any designated portion thereof, which are in the possession of the Contractor, or any Subcontractor of the Contractor, shall be made available to the Owner or the Architect for inspection and copying upon written request by the Owner. Furthermore, said documents shall be made available, upon request by the Owner, to any state, federal or other regulatory authority and any such authority may review, inspect and copy such records. Said records include, but are not limited to all drawings, plans, specifications, approved submittals, correspondence, minutes, memoranda, tape recordings, videos, or other writings or things which document the Project, its design, and its construction. Said records expressly include those documents reflecting the cost of construction to the Contractor. The Contractor shall maintain and protect these documents for no less than ten (10) years after final completion of the Project, or for any longer period of time as may be required by law or good construction practice.

46.11 In no event is the Contractor permitted to use any portion of the contract documents for other projects without written authorization of Eastern Kentucky University.

47. Miscellaneous Provisions Regarding Contractor's Work

47.1 Project Site Limits The Contractor shall confine his apparatus, the storage of materials, and the operations of his workmen to Project site limits indicated by the Contract Documents.

47.2 Points of Reference The Contractor shall carefully preserve bench marks, reference points and stakes, and in case of willful or careless destruction, he shall be charged with the resulting expense of replacement and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.

47.3 Cutting and Patching The Contractor shall be responsible for cutting, fitting or patching required to complete the Project or make its parts fit together in a proper manner. The Contractor shall not endanger other parts of the Project, including work by the Owner or other contractors as provided in Article 33, by cutting, patching, or excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a separate contractor without written consent of the Owner or such separate contractor. Such consent shall not be unreasonably withheld.

47.4 Cleanup The Contractor shall at all times keep the Project premises and surrounding area free from the accumulation of waste materials or rubbish caused by his operations in connection with the Project. Upon completion of the Work, and prior to final inspection and acceptance, the Contractor shall remove all remaining waste materials, rubbish, Contractor’s construction equipment, tools, machinery, and surplus materials and leave the Project (including but not limited to glass, hardware, fixtures, masonry, tile and marble) in a clean and usable condition satisfactory to the Architect. Floors shall be cleaned and waxed in accordance with the requirements of the Contract specifications. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may perform the cleaning tasks and charge the cost to the Contractor.

47.5 Guarantees, Warranties, and “As-Built” Drawings Prior to final payment for the Work, the Contractor shall assemble and present to the Architect all guarantees and warranties required by the Contract Documents. Additionally the Contractor shall provide “Record” Drawings prior to final payment.

47.6 Governing Law The Contract shall be governed by the laws of the Commonwealth of Kentucky.

47.7 Statutory Limitation Periods Statutes of Limitations are governed by KRS 45A.260(2).

47.8 Written Notice Written notice shall be deemed to have been given if delivered in person to the individual or to a member of the organization or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last known business address known to the notifying party.

48. Apprentices Apprentices (for all classifications of work) shall be permitted to work only under
an apprenticeship agreement approved by the Kentucky Supervisor of Apprenticeship and by the Kentucky Apprenticeship Council which is recognized by the Bureau of Apprenticeship and Training, U. S. Department of Labor.

49. **Nondiscrimination in Employment** During the performance of the Contract, the Contractor agrees as follows:

49.1 The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, national origin, or disability in employment.

49.2 The Contractor will take affirmative action in regard to employment, upgrading, demotion, transfer, recruitment, recruitment advertising, layoff, termination, rates of pay or other forms of compensation, and selection for training, so as to ensure that applicants are employed and that employees during employment are treated without regard to their race, color, religion, sex, age, or national origin; however, when layoffs occur, employees shall be laid off according to seniority with the youngest employees being laid off first. When employees are recalled, this shall be done in the reverse way the employees were laid off;

49.3 The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, or national origin;

49.4 The Contractor will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provisions of the nondiscrimination clauses required by this section;

49.5 The Contractor shall send to each labor union or representatives of workers with which he has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers’ representatives of the Contractor’s commitments under this section.

49.6 Failure to comply with the above nondiscrimination clause constitutes material breach of Contract.

50. **Affirmative Action: Reporting Requirements** The Contractor and Subcontractors are exempt from any affirmative action or reporting requirements, under the Kentucky Equal Employment Act of 1978, KRS 45.560 to 45.640 hereinafter referred to as The Act, if any of the following conditions are applicable:

50.1 The Contractor and Subcontractors are exempt from any affirmative action or reporting requirements, under the Kentucky Equal Employment Act of 1978, KRS 45.560 to 45.640 hereinafter referred to as The Act, if any of the following conditions are applicable:

50.1.1 The Contract or Subcontract awarded is in the amount of five hundred thousand dollars ($500,000) or less, and the amount of the contract is not a subterfuge to avoid compliance with the provisions of The Act; or

50.1.2 The Contractor or Subcontractor utilizes the services of fewer than eight (8) employees during the course of the Contract; or

50.1.3 The Contractor or Subcontractor employs only family members or relatives; or

50.1.4 The Contractor or Subcontractor employs only persons having a direct Ownership interest in the business and such interest in not a subterfuge to avoid compliance with the provisions of The Act.

50.2 The Contractor or Subcontractor not otherwise exempted shall for the duration of the Contract, hire minorities from within the drawing area to satisfy the agreed upon goals and timetables set out in addenda to the Contract. Should the union with which the Contractor has collective bargaining agreements be unwilling to provide sufficient minorities to satisfy the goals and timetables, the Contractor shall hire minorities from other sources within the drawing area to satisfy the goals and timetables in the addenda to the Contract.

50.3 The equal employment provisions of The Act may be met in part by the Contractor subcontracting to a minority contractor or subcontractor. A minority contractor or subcontractor shall be defined by the addenda to this Contract, or if none, by the Act.
50.4 Each Contractor shall, for the length of the Contract, furnish such information as required by The Act and by such rules, regulations and orders issued pursuant thereto and will permit access to all books and records pertaining to his employment practices and work sites by the contracting agency and the department for purposes of investigation to ascertain compliance with The Act and such rules, regulations and orders issued pursuant thereto.

50.5 If the Contractor is found to have committed an unlawful practice against a provision of The Act during the course of performing under this Contract, (if covered by The Act), the Owner may cancel or terminate the Contract, conditioned upon a program for future compliance approved by the Owner. The Owner may also declare such Contractor ineligible to bid on further contracts until such time as the Contractor complies in full with the requirements of The Act.

50.6 The Contractor shall not be required to terminate an existing employee, upon proof that employee was employed prior to the date of the Contract nor hire anyone who fails to demonstrate the minimum skills required to perform a particular job.

51. **Access to Records**

The contractor, as defined in KRS 45A.030(7), agrees that EKU, the Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, shall have access to any books, documents, papers, records, or other evidence, which are directly pertinent to this contract for the purpose of financial audit or program review. Furthermore, any books, documents, papers, records, or other evidence provided to the EKU, the Finance and Administration Cabinet, the Auditor of Public Accounts, or the Legislative Research Commission which are directly pertinent to the contract shall be subject to public disclosure regardless of the proprietary nature of the information, unless specific information is identified and exempted and agreed to by the Secretary of the Finance and Administration Cabinet as meeting the provisions of KRS 61.878(1)(c) prior to the execution of the contract. The Secretary of the Finance and Administration Cabinet shall not restrict the public release of any information which would otherwise be subject to public release if a state government agency was providing the service (22 Ky.R. 1510; eff. 5-16-96).

52. **Campus Map**

For a digital copy of our updated map see [http://parking.eku.edu/](http://parking.eku.edu/).
Bid Number: EKU 140-20

Project: Outdoor Volleyball Complex

Project Specifications
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SECTION 024119 - SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected site elements.
2. Salvage of existing items to be reused or recycled.
3. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

B. Related Sections include the following:

1. Division 01 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
2. Division 01 Section "Photographic Documentation" for preconstruction photographs taken before selective demolition operations.
3. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
4. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
5. Division 01 Section "Construction Waste Management and Disposal" for disposal of demolished materials.
6. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner at requested location on Campus.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
E. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

F. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 MATERIALS OWNERSHIP

A. Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 SUBMITTALS

A. Qualification Data: For demolition firm.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.
5. Coordination of Owner's continuing occupancy of portions of existing site.
6. Means of protection for items to remain and items in path of waste removal.

C. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Architect's or Construction Manager's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
E. Pre demolition Photographs or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.

F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Pre demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.

E. 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.

F. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.7 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

D. Storage or sale of removed items or materials on-site is permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.

2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

D. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
E. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and/or preconstruction videotapes.

   1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

   1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

   1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
   2. Arrange to shut off indicated utilities with owner.
   3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

   1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

   1. Provide protection to ensure safe passage of people around selective demolition area.

C. 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.
D. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces
2. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:

1. Transport items to Owner's storage area designated by Owner on Campus.
2. Protect items from damage during transport and storage.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.
END OF SECTION 024119
SECTION 221113 – FACILITY WATER DISTRIBUTION PIPING - MODIFIED

PART 1 - GENERAL

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

1.2 SUMMARY
   This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS
   A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
   B. Field quality-control test reports.

1.5 QUALITY ASSURANCE
   A. Regulatory Requirements:
      1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
      2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
      3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
   B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. During storage and delivery protect all products from weather, moisture, and dirt. All factory end caps shall stay installed unless removal is necessary for inspection. Caps shall be reinstalled after
inspection. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 PVC, AWWA Pipe: AWWA C900, with bell end with gasket, and with spigot end. For pipes under 4 inches pipe shall be assumed SDR-17 unless otherwise approved through written request.

A. Comply with UL 1285 for fire-service main if indicated.

B. PVC Fabricated Fittings: AWWA C900 with bell-end-spigot or double-bell ends. Include elastomeric gasket in each bell.

C. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

PART 3 - EXECUTION

3.1 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. Required cover depth of 30 inches, unless otherwise indicated.

B. Excavate trenches to uniform widths to provide 12 inches of 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.

C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.2 UTILITY TRENCH BEDDING, BACKFILLING, AND IDENTIFICATION

A. Refer to Section 312000 “Earth Moving” for bedding, backfilling, and identification.
3.3 PIPING APPLICATIONS

A. Piping shall be C900 PVC Pressure Pipe and shall meet the requirements of AWWA C-900. Bell joints shall meet the requirements of ASTM D-3139. Seals shall meet the requirements of ASTM F-477. F or pipes under 4 inch, pipe shall be assumed SDR-17 unless otherwise approved through written request.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

3.4 PIPING INSTALLATION.

A. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.

B. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

C. After installation and testing, cap pipe at limits of construction.

3.5 FIELD QUALITY CONTROL

A. Piping Tests: Contractor to pressure test before capping ends. Prepare reports of testing activities. Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

3.6 CLEANING

A. Clean and disinfect water-distribution piping as follows:
   1. Use purging and disinfecting procedure prescribed by Richmond Utilities.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113
SECTION 260000 - ELECTRICAL GENERAL PROVISIONS

PART 1  GENERAL

1.1 WORK INCLUDED

A. Provide labor, equipment, materials, supplies and components, and perform all operations necessary for installation of complete electrical system.

B. It is not the intent of this section to make any Contractor, other than the General Contractor alone, the single responsible party to the Owner. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be done through the General Contractor. No attempt has been made to arbitrarily assign responsibility of work, material, equipment or services to a particular trade or Contractor. Unless stated otherwise, subdivision and assignment of work shall be General Contractor’s responsibility.

C. Facilities and systems of electrical work are described, but not limited to the following:

1. Complete demolition and removal of existing.
2. Temporary relocation of services and utilities necessary for phasing of construction work.

D. Provide functional testing of Interior Lighting, Exterior Lighting, Lighting Control Devices, and Network Lighting Controls including all labor, equipment, materials, supplies and components, and perform all operations per IECC 2012, C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer’s installation instructions. The Electrical Contractor shall be responsible for including all functional testing in the bid. An approved third party independent contractor from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the Engineer certifying that the installed lighting controls meet the provisions of Section C405.

1. Where occupant sensors, time switches, programmable schedule controls, photo-sensors or daylighting controls are installed, the following procedures shall be performed:
   a. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
   b. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
   c. Confirm that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

1.2 RELATED DOCUMENTS

A. General Provisions of Contract, General and Special Conditions, and General Requirements, apply to this Section.
1.3 QUALITY ASSURANCE

A. Minimum standards for all electrical work shall be latest revision of National Electrical Code (NEC). Whenever and wherever OSHA, NFPA, State Building Codes, Federal and State laws, regulations and design require higher standards than the NEC, these laws, regulations, and designs shall be followed.

B. Electrical inspection on all construction projects is required. The Electrical Inspection for this Project shall be provided by a STATE Electrical Inspector from the Kentucky State Fire Marshall's Office and may be ordered by calling (502) 564-3626. The Contractor shall provide and coordinate all Electrical Inspections as required by the STATE Electrical Inspector. Notify this STATE Electrical Inspector in writing immediately upon start of work and provide a copy of start work notice to the Architect/Engineer. The Contractor shall pay for all required inspections.

1. Provide all necessary inspections including both rough and finish work. Submit copies of all interim inspection reports to the Architect/Engineer as they occur.

2. Prior to final acceptance of work and release of final payment, submit to the Architect/Engineer the certificate of final inspection.

3. Approval from the STATE Electrical Inspector will not be allowed as reason for deviation from Contract Documents.

C. Obtain all permits required for entire construction of electrical system from authorities governing such work.

D. All materials shall be new and best of their respective kinds unless otherwise specified and shall be listed by UL and shall be so labeled. All equipment shall conform to latest approved standards of I.E.E.E., N.E.M.A., A.N.S.I., U.L. and O.S.H.A. See individual specification sections for other specific requirements.

E. Performance of work shall be in strict accordance with the best common practices in a thorough, substantial, neat and workman-like manner by competent, qualified workmen.

1.4 CONTRACT DOCUMENTS

A. Contract Documents are intended to cover furnishing and installing of complete electrical systems including miscellaneous systems, all tested and ready for operation.

B. Drawings

1. Drawings are schematic and show approximate locations of devices and equipment. Coordinate and field verify exact locations with other trades. Obtain A/E approval for significant deviations from drawing locations and layout.

2. The A/E reserves the right to make minor changes in the locations of electrical work or equipment prior to roughing-in without additional cost.
3. Examine the Contract Documents and immediately report any error, discrepancy or omission. The A/E will determine which interpretation shall take precedence where two or more conflicting statements occur. Otherwise, the Contractor is responsible for the more stringent interpretation. In general, schedules where they appear supersede specifications and specifications supersede plans.

4. Contract Documents are complementary, each to the other, and work required by either shall be included in the contract as if called for by both. Contractor shall make use of all data in the Contract Documents and shall verify this information at the building site. All Drawings on the Contract set are hereby made a part of these Specifications and shall be consulted by the Contractor and his work adjusted to meet the conditions shown thereon.

C. Drawings other than electrical drawings, and other sections of this specification, may show or specify electrically operated equipment and wiring diagrams. Examine all such drawings and specifications. Determine characteristics and provide necessary wiring and connections for all such equipment.

D. Keep electrical record drawings up to date each day. Record drawings will be reviewed by Architect/Engineer each month with Contractor's pay request submission.

1.5 SUBMITTALS

A. Refer to the Division 1 sections for general requirements concerning work-related submittals. For electrical work, the following minimum quantities are required for each category of submittal, unless greater quantity indicated in Division 1 requirements or individual work sections (quantity does not include copies required by governing authorities, or by Contractor for its own purpose.)

(1) Shop Drawings: 6 sets, including 3 for maintenance manuals.
(2) Product Data: 6 sets, including 3 sets for maintenance manuals.
(3) Samples: 3 sets of final submission.
(4) Certifications: 3 copies.
(5) Test Reports: 3 copies.
(6) Warranties (Guarantees): 6 copies, including 3 for maintenance manuals.
(7) Maintenance Manuals: 3 final copies, including wiring diagrams, maintenance and operating instructions, parts listings, and copies of other submittals indicated for inclusion.

B. Each submittal shall have Architect's/Engineer's Project Number, Specification Section Number, Schedule, Material and Data Submitted, indicated on its cover sheet. Each submittal sheet shall be marked so Architect/Engineer may readily determine particular item Contractor proposes to furnish.

1.6 OPERATING AND MAINTENANCE MANUALS

A. Submit to Architect/Engineer prior to substantial completion (6) copies of complete operating and maintenance instructions for equipment provided under this Contract.
Provide complete parts lists for all new major equipment items. Refer to Special Conditions for additional requirements concerning maintenance manuals.

B. Organize each maintenance manual with index and thumb-tab marker for each section of information; bind in 2", 3-ring, vinyl-covered binder(s) with pockets to contain folded sheets, properly labeled on spine and face of binder(s).

C. Index of contents shall include subcontract equipment vendor's names and addresses.

D. Include Brochures, data, parts lists, warranties, wiring diagrams, and manufacturer's operating and maintenance instructions. Final approved shop drawings shall be bound separately and submitted with other operating and maintenance information.

1.7 WARRANTY

A. Contractor shall be responsible for warranting all work, including equipment, materials, and workmanship provided under this section. Unless indicated otherwise under specific specification sections, this warranty shall be against all defects of the above and shall run a minimum period of one (1) year from date of substantial completion.

B. Defective work, equipment, materials and workmanship that develops within warranty period, which is not caused by ordinary wear, damage or abuse by others, shall be replaced or corrected without additional cost to Owner.

1.8 ALTERATIONS AND REMODELING

A. In alteration, extension and remodeling projects, existing conduits shall be extended, altered, or reconnected as indicated. Where existing conduits which are indicated to be revised, or which will be essential to the functioning of particular system, are cut or exposed due to construction changes, new connections shall be made in the most expeditious manner as directed or indicated. Where wiring is involved, new wires shall be "pulled in" between nearest available, accessible, reused outlets. In all cases where new wires are required, indicated or specified to be installed in existing conduits, if same cannot be installed, new conduits shall be provided as directed. Connect all new conduit, wiring, and apparatus to existing systems to function as complete units.

B. All conduits and electrical apparatus, in place and not indicated or specified to be reused or which will not be essential to the functioning of various systems when work is complete, shall be removed and stored where directed. No old material shall be reinstalled or reused unless otherwise indicated on drawings or specified. Concealed conduits which are not indicated or specified to be reused and become exposed due to construction changes shall be removed to nearest available, accessible, reused outlets.

C. Carefully lay out in advance, and where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work, this work shall be carefully done by dry core drilling and sawing. Damage to building,
piping, or equipment shall be repaired by skilled mechanics of trades involved at no additional cost to Owner.

D. Electrical and communication service downtime shall be kept to a minimum. Any necessary utility outages shall be scheduled with the Owner a minimum of two weeks in advance. Scheduled outages must occur during times in which the building(s) are normally unoccupied.

E. Unless indicated otherwise, all electrical equipment, etc. which is to be removed and not reinstalled as part of this project, shall become the property of the Contractor. It shall be the responsibility of the Contractor to properly handle and dispose of these items.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules to avoid conflict with work and site conditions.

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

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

B. Store products in accordance with manufacturer’s instructions with seals and labels intact. Store and protect materials and equipment delivered to site in such a manner as to effectively prevent damage from climatic conditions, condensation, dust, and physical abuse.

1. Store fabricated products above ground on blocking.

2. Arrange storage in a manner to provide access for inspection. Make periodic inspections of stored materials to assure that products are maintained free from damage and deterioration

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTurers, STANDARD PRODUCTS AND SUBSTITUTIONS

A. All material and equipment shall be new and in good condition. Refer to Division 1 for additional requirements.

B. Design is based upon a specific make and model of equipment. Naming of a certain brand or make or manufacturer in the specifications is to establish style or quality standard for articles desired. However, except where noted, the specifications are not intended to limit competition or the Contractor’s option to use alternate products of equivalent concept, quality, and performance.

C. Products of alternate manufacturers listed may be substituted without approval prior to the Bid, if they are regularly catalogued items and meet the criteria of equivalence
in concept, quality, and performance in the opinion of the Engineer. It is
recommended that the opinion of the Engineer be solicited prior to the bid if there
are any questions. This opinion does not guarantee approval of the submittals at a
later time. In the case where the equipment is unfamiliar to the Engineer, all
vendors desiring to furnish equipment other than that specified must submit, in
addition to ordinary shop drawings, a complete verification specification for the
substituted equipment along with catalogs, literature, wiring diagrams, piping
diagrams, and a list of similar sized installations where the proposed equipment is
installed. This information may be required to be presented immediately after the
Bid and lack of information or of qualifications, as judged by the Engineer, may
result in a Bid not being accepted.

D. All products which require submittals, whether design basis or otherwise accepted,
must be formally approved by the Engineer before shipment to the job.

E. All materials and equipment shall be manufactured in the United States or by U.S.
owned and operated companies unless otherwise indicated. Specific permission
must be obtained from the Engineer for any deviation from this policy.

F. The Contractor is responsible for any and all costs for changes to the electrical work
or the work of other trades necessitated by the optional substitution of approved
alternate equipment. Approval of alternate equipment or modifications to the plans
by the Engineer are not to be construed as relief from this responsibility. In the case
of significant modification to the design, the Contractor may also be required to pay
for the cost of design review and/or redesign by the Engineer.

G. Listing: The successful bidder shall furnish to the Engineer within one hour of the
Bid opening, or as indicated in bidding instructions, a list of all major items of
electrical equipment to be provided, indicating the manufacturer and the general
type. Any list of required items included in the Bid Form, Instructions to Bidders or
other Bid documents shall supersede these items. Changing manufacturers or
subcontractors after the listing will not be acceptable, unless initiated by the Owner
or the Engineer. Final acceptance of the bids is contingent upon submission and
approval of these lists.

2.2 QUANTITIES AND COMPLETENESS

A. Items may be referred to as singular or plural on drawings and specifications.
Contractor is responsible for determining quantity of each item.

B. All components required for the complete installation and legal, proper and safe
operation of equipment and systems indicated in the Documents shall be provided
by the Contractor. Optional accessory items shall be included only as specified.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES

A. Refer to Division 1 sections for general requirements for temporary facilities.
B. All such equipment shall be removed when permanent connections have been completed. Where it is determined, during construction, that temporary facilities, as installed, interfere with construction operations, relocate said facilities in an approved manner at no cost to Owner. Temporary connections shall be in accordance with NEC and OSHA requirements. Repair damage or injury to equipment, materials, or personnel caused by improperly protected temporary installations. All costs for materials and installation for temporary electrical facilities and energy for their operation shall be as specified in Division 1.

3.2 COORDINATION

A. Coordinate work of different trades so that:

B. All electrical materials and equipment shall be kept close as possible to ceiling, walls and columns, to take up a minimum amount of space.

C. Provide all offsets, fittings and similar items necessary in order to accomplish requirements of coordination without additional expense to Owner.

D. Drawings are diagrammatic and indicate general location of material and equipment. Refer to architectural and structural drawings and specifications for general construction of building, for floors and ceiling heights and for locations of walls, partitions, beams, and equipment, and be guided accordingly for setting of all equipment. Do not scale electrical drawings to determine exact locations.

E. Be responsible for locating all openings required in walls, floors, ceilings or roof for all materials and equipment provided under Electrical sections as well as providing manufacturer’s standard fire-stopping sealant for openings to equal fire resistance rating of the fire rated wall, floor, ceiling or partition.

1. Check with other trades on scope of their work and coordinate on all locations of various items of equipment and outlets before they are finally placed and connected. Relocation of material or equipment necessitated by failure to coordinate work shall be at no cost to Owner.

2. Do not cut work of any other trade without first consulting Architect's representative. Repair work damages by employing services of trade whose work is damaged. Where openings or sleeves have been omitted, they shall be drilled or sawed as directed by Architect/Engineer. All cutting and patching shall be the responsibility of this Section.

3. Wherever slots, sleeves or other openings are provided in floors or walls, for the passage of conduits or other forms of raceway, such openings, if unused, or spaces left in such openings after installation of conduit or raceway shall be filled. Filling materials for openings in walls and floors generally shall be fire-resistant and constructed and installed so as to prevent passage of water, smoke and fumes. Where conduits passing through openings are exposed in finished rooms, finishes of filling materials shall match and be flush with adjoining floor, ceiling or wall finishes.
4. Provide exposed conduit passing through floors, walls, or ceilings of finished rooms with chrome plated escutcheons. Plates shall be split, hinged type of sufficient outside diameter to amply cover up sleeve openings for pipe. Manufacturer's offering products complying with requirements include:

Beaton and Caldwell, No. 10 or Approved Equal

5. Where conduits, and other electrical raceways pass through fire protections, fire walls, smoke partitions or floors, install a firestop to prevent the spread of fire, smoke and gases. Firestop material shall be packed tight and completely fill clearance between raceways and openings. Conduit sleeves for cable passage require a non-hardening, permanently pliable firestop system capable of being removed and reinstalled to permit the addition of cables. All firestop systems shall be U.L. listed for the application and installed in accordance with manufacturer's recommendations.

3.3 CLEANING

A. At completion of work required under this Contract and just prior to acceptance by Owner, thoroughly clean all exposed equipment fittings, fixtures, lenses and accessories and repair any damaged surfaces.

B. All electrical equipment shall be free of shipping tags, stickers, etc. Light fixture diffusers shall be clean and equipment enclosures shall be free of dust and debris. All painted equipment shall be free of scratches, blemishes and splattered paint.

3.4 SUPPORT OF ELECTRICAL ITEMS

A. Unless otherwise indicated, all electrical items or their supporting hardware, including but not limited to, conduits, raceways, cable trays, busways, cabinets, panelboards, wall-mounted transformers, boxes, and disconnect switches, shall be securely fastened to the building structure with the following methods. Fastening shall be by wood screws or screw-type nails on wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded studs driven in by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts or machine or wood screws. Threaded C-clamps with retainers may be used on rigid and intermediate steel conduit only. Conduits or pipe straps shall not be welded to steel structures. In partitions of light steel construction, sheet metal screws shall be used.

B. The load applied to any fastener shall not exceed one-fifth of the proof test load. Fasteners attached to concrete ceilings shall be vibration and shock-resistant.

3.5 TESTING AND BALANCING

A. Feeders and branch circuits shall have their insulation tested after installation, and before connection to fixtures and appliances. Perform with a 500-volt megger. Conductors shall test free from short-circuits and grounds. Test conductors phase-to-phase and phase-to-ground. Test readings shall be recorded and delivered to Architect/Engineer.
C. Circuit numbers indicated on the Drawings and panel schedules shall be adhered to. Any deviations shall be approved by the Architect/Engineer before installation.

D. Other tests to verify proper installation and operation shall include:

   (a) Proper operation of fixtures and equipment
   (b) Continuity of conduit systems

3.6 DEMONSTRATION

A. Provide to Owner a demonstration of installed systems. Coordinate demonstration with parties involved. Owner's representative may include persons who will be regularly providing maintenance, Architect, and Engineer.

B. Contractor shall have previously operated equipment and corrected deficiencies prior to arranging demonstration. Contractor shall have made himself familiar with system's proper operations, so demonstration shall proceed without wasting time of Owner's representatives.

3.7 TRAINING

A. Manufacturers supplying equipment for this division shall provide training in the operation and maintenance of equipment furnished to the owner's personnel. Training shall take place at the project site after the equipment is fully operational. Refer to individual sections for specific training requirements.

END OF SECTION 260000
SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Sections include the following:

1. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.2 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alcan Products Corporation; Alcan Cable Division.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.
B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and SO.

D. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC and Type SO with ground wire.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFC Cable Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. 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, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway; Metal-clad cable, Type MC.
F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway; Metal-clad cable, Type MC.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

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 and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.
3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
   A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.6 FIRESTOPPING
   A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to
      restore original fire-resistance rating of assembly according to Division 07 Section
      "Penetration Firestopping."

END OF SECTION 260519
SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Grounding systems and equipment.

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 UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 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:

4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Bare Grounding Conductor and Conductor Protector for Wood Poles:

1. No. 4 AWG minimum, soft-drawn copper.
2. Conductor Protector: Half-round PVC or wood molding; if wood, use pressure-treated fir, cypress, or cedar.

D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 5/8 by 96 inches (16 by 2400 mm) in diameter.

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 barecopper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.

C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.

D. 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.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.

1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch (6.3-by-100-by-300-mm) grounding bus.
3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

E. Metal and Wood 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.

3.3 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 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
   2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
   3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:
   1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
   2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
   3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
H. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.

1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:
   1. Power and Lighting Equipment or System with Capacity of 5000 kVA and Less: 5 ohms.
   2. Power and Lighting Equipment or System with Capacity More Than 5000 kVA: 3 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526
SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

B. Related Sections include the following:
   1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.
1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Allied Tube & Conduit.
      b. Cooper B-Line, Inc.; a division of Cooper Industries.
      c. ERICO International Corporation.
      d. GS Metals Corp.
      e. Thomas & Betts Corporation.
      f. Unistrut; Tyco International, Ltd.
      g. Wesanco, Inc.
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
   4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
   5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

   a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      1) Cooper B-Line, Inc.; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti Inc.
      4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

5. Toggle Bolts: All-steel springhead type.


PART 3 - EXECUTION

3.1 APPLICATION

   A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

   B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

   C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

      1. Secure raceways and cables to these supports with single-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

   A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

   B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified
loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529
SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Metal conduits, tubing, and fittings.
      2. Nonmetal conduits, tubing, and fittings.
      3. Metal wireways and auxiliary gutters.

1.3 DEFINITIONS
   A. GRC: Galvanized rigid steel conduit.
   B. IMC: Intermediate metal conduit.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS
   A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1. AFC Cable Systems, Inc.
      3. Anamet Electrical, Inc.
      4. Electri-Flex Company.
      5. O-Z/Gedney; a brand of EGS Electrical Group.
      6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
      7. Republic Conduit.
      8. Robroy Industries.
     10. Thomas & Betts Corporation.
     11. Western Tube and Conduit Corporation.
     12. Wheatland Tube Company; a division of John Maneely Company.
B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797.

F. FMC: Comply with UL 1; zinc-coated steel.

G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
   a. Material: Steel.
   b. Type: Set screw or compression.

3. 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.

4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

I. Joint Compound for IMC or 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, TUBING, AND FITTINGS

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. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.
3. Arnco Corporation.
4. CANTEX Inc.
5. CertainTeed Corp.
7. Electri-Flex Company.
8. Kraloy.
9. Lamson & Sessions; Carlon Electrical Products.
10. Niedax-Kleinhuis USA, Inc.
11. RACO; a Hubbell company.
12. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

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. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
4. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, suitable for environment where installed, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

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. EGS/Appleton Electric.
2. Erickson Electrical Equipment Company.
3. Hoffman; a Pentair company.
4. Hubbell Incorporated; Killark Division.
5. Kraloy.
7. O-Z/Gedney; a brand of EGS Electrical Group.
8. RACO; a Hubbell Company.
9. Robroy Industries.
10. Thomas & Betts Corporation.

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. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
   1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep) with plaster ring.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed Conduit: RNC, Type EPC-40-PVC.
   2. Concealed Conduit, Aboveground: RNC, Type EPC-40-PVC.
   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. Indoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
a. Loading dock.
b. Mechanical rooms.
c. Gymnasiums (exposed below 10").

3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: GRC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch (24-mm) trade size.

D. 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. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

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. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. A. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Raceways shall not be embedded in slabs:
   1. Change from RNC, Type EPC-40-PVC to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for raceways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. 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.

L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. 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 (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. 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.

Q. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

S. 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.
T. 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. Where otherwise required by NFPA 70.

U. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

V. Expansion-Joint Fittings:

1. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
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.

W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for 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.

X. 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.

Y. 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.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

BB. 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.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.

2. Install backfill as specified in Division 31 Section "Earth Moving."

3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."

4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.

b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

5. Underground Warning Tape: Comply with requirements in Division 26 Section "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.6 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 260533
SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Identification for raceways.
      2. Identification of power and control cables.
      3. Identification for conductors.
      5. Warning labels and signs.
      6. Instruction signs.
      7. Equipment identification labels.
      8. Miscellaneous identification products.

1.3 QUALITY ASSURANCE
   A. Comply with ANSI A13.1.
   B. Comply with NFPA 70.
   D. Comply with ANSI Z535.4 for safety signs and labels.
   E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION
   A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
   B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Tape:
   1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   2. Printing on tape shall be permanent and shall not be damaged by burial operations.
   3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:
   1. Comply with ANSI Z535.1 through ANSI Z535.5.
   2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: , COMMUNICATIONS CABLE.

2.4 WARNING LABELS AND SIGNS


B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:
   1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch (6.4-mm) grommets in corners for mounting.
   3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
   2. 1/4-inch (6.4-mm) grommets in corners for mounting.
   3. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
   1. Engraved legend with white letters on black face.
   2. Punched or drilled for mechanical fasteners.
   3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.7 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.
G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.

H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.

b. Colors for 208/120-V Circuits:

   1) Phase A: Black.
   2) Phase B: Red.
   3) Phase C: Blue.

   c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

B. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.


C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.

2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

D. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and
29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

E. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

F. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:
   a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
   b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
   c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
   d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:
   a. Panelboards: Type written directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
   b. Enclosures and electrical cabinets.
   c. Access doors and panels for concealed electrical items.
   d. Enclosed switches.

END OF SECTION 260553
SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Distribution panelboards.
      2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS
   A. SVR: Suppressed voltage rating.
   B. TVSS: Transient voltage surge suppressor.
   C. SPD: Surge Protection Device equal to TVSS.
   D. GFCI: Ground Fault Circuit Interrupter.

1.4 PERFORMANCE REQUIREMENTS
   A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

      1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS
   A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers’ technical data on features, performance, electrical characteristics, ratings, and finishes.
B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Include evidence of NRTL listing for series rating of installed devices.
   6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   7. Include wiring diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field Quality-Control Reports:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Panelboard Schedules: For installation in panelboards.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," 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.
1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

1.11 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance
requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

B. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.
   a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
   b. Outdoor Locations: NEMA 250, Type 3R.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

3. Finishes:
   a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.


C. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated copper.

2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

D. Conductor Connectors: Suitable for use with conductor material and sizes.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.

E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

G. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.

2.2 DISTRIBUTION PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.
D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating interrupting capacity to meet available fault currents.


2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).


4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

   a. Standard frame sizes, trip ratings, and number of poles.
   b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
   c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
   d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
   e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
   f. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
   g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
   h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.5 PANELBOARD SUPPRESSORS

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

1. Current Technology; a subsidiary of Danahar Corporation.
2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Liebert Corporation.
5. Siemens Energy & Automation, Inc.
6. Square D; a brand of Schneider Electric.

B. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, non-modular type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:

1. Accessories:
   a. LED indicator lights for power and protection status.
   b. Audible alarm, with silencing switch, to indicate when protection has failed.
   c. One set of dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.

C. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:

1. Accessories:
   a. Fabrication using bolted compression lugs for internal wiring.
   b. Integral disconnect switch.
   c. Redundant suppression circuits.
   d. Redundant replaceable modules.
   e. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
   f. LED indicator lights for power and protection status.
   g. Audible alarm, with silencing switch, to indicate when protection has failed.
   h. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
   i. Four-digit, transient-event counter set to totalize transient surges.

2. Peak Single-Impulse Surge Current Rating: 120 kA per mode/240 kA per phase.
   a. Line to Neutral: 70,000 A.
   b. Line to Ground: 70,000 A.
   c. Neutral to Ground: 50,000 A.

4. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.
5. Protection modes and UL 1449 SVR for grounded wye circuits with 208Y/120-V, three-phase, four-wire circuits shall be as follows:
   a. Line to Neutral: 400 V for 208Y/120.
b. Line to Ground: 400 V for 208Y/120.
c. Neutral to Ground: 400 V for 208Y/120.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.
B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
C. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
D. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.
E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
F. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.
G. Install filler plates in unused spaces.
H. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
J. Comply with NECA 1.
3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

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 stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. 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. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated

END OF SECTION 262416
SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.
   2. Twist-locking receptacles.
   3. Tamper-resistant receptacles.
   5. Snap switches and wall-box dimmers.
   7. Wall-switch and exterior occupancy sensors.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.
B. GFCI: Ground-fault circuit interrupter.
C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
D. RFI: Radio-frequency interference.
E. TVSS: Transient voltage surge suppressor.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 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 application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Cooper; 5351 (single), CR5362 (duplex).
   b. Hubbell; HBL5351 (single), HBL5352 (duplex).
   c. Leviton; 5891 (single), 5352 (duplex).
   d. Pass & Seymour; 5361 (single), 5362 (duplex).
2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; VGF20.
   b. Hubbell; GFR5352L.
   c. Pass & Seymour; 2095.
   d. Leviton; 7590.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Single Pole:
      1) Cooper; AH1221.
      2) Hubbell; HBL1221.
      3) Leviton; 1221-2.
      4) Pass & Seymour; CSB20AC1.
   b. Three Way:
      1) Cooper; AH1223.
      2) Hubbell; HBL1223.
      3) Leviton; 1223-2.
      4) Pass & Seymour; CSB20AC3.
   c. Four Way:
      1) Cooper; AH1224.
      2) Hubbell; HBL1224.
      3) Leviton; 1224-2.
      4) Pass & Seymour; CSB20AC4.
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. Cooper; AH1221L.
   b. Hubbell; HBL1221L.
   c. Leviton; 1221-2L.
   d. Pass & Seymour; PS20AC1-L.

2. Description: Single pole, with factory-supplied key in lieu of switch handle.

D. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Hubbell; HBL1557.
   c. Leviton; 1257.
   d. Pass & Seymour; 1251.

E. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

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. Cooper; 1995L.
   b. Hubbell; HBL1557L.
   c. Leviton; 1257L.
   d. Pass & Seymour; 1251L.

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.7 FINISHES

A. Device Color: Color selected by Architect.
1. Wiring Devices Connected to Normal Power System: unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: Color selected by Architect

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 meet provisions of NFPA 70, Article 300, without pigtailed.

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 pigtailed that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 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 Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. 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.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
3. Using the test plug, verify that the device and its outlet box are securely mounted.
4. 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.

C. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 262726
SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

   1. Cartridge fuses rated 600-V ac and less for use in control circuits enclosed switches.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

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 FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.4 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (5 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.5 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:
   1. Motor Branch Circuits: Class RK5, time delay.
   2. Other Branch Circuits: Class RK5, time delay.
   3. Control Circuits: Class CC, fast acting.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813
SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.

1.3 DEFINITIONS

A. NC: Normally closed.
B. NO: Normally open.
C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
B. 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 a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge fuse interiors to accommodate specified fuses, lockable handle with capability to accept two 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. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two 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. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
   1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
   2. Outdoor Locations: NEMA 250, Type 3R.
   4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
   5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "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. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816
SECTION 264300 - SURGE SUPPRESSION DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surge Suppression Devices (SPD).

1.2 RELATED SECTIONS

A. Section 262416 - Panelboards.

C. Section 283111 - Fire Alarm Systems.

1.3 REFERENCES


1.4 REQUIRED SUBMITTALS
A. Submit manufacturer's data on TVSS products and enclosures. Project Data: Include rated capacities; shipping, installed and operating weights; furnished specialties; and accessories for each model indicated.


C. Single Pulse Surge Current Capacity: Provide 3rd party test data verifying that testing has been performed on a COMPLETE device, including all necessary fusing, disconnects, thermal disconnects, etc.

D. Minimum Repetitive Surge Current Capacity: Provide 3rd party test data verifying that testing has been performed on a COMPLETE device, including all necessary fusing, disconnects, thermal disconnects, etc.

E. Short Circuit Current Rating (AIC): Provide 3rd party test data verifying that testing has been performed on a COMPLETE device.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

B. Maintain one copy of document on site.

C. Each complete suppression unit shall be Underwriters Laboratories, Inc. approved.

D. Each complete suppression unit shall be UL 1449 listed and shall bear the suppressed voltage rating issued by UL for all protected modes.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience, certified as compliant with ISO 9001:1994, and accredited by the UK National Accreditation Council for Certification Bodies. Provide a copy of the ISO 9001:1994 Certificate of Registration to Architect/Engineer.

B. Supplier: Franchised distributor of specified manufacturer with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 WARRANTY
A. Manufacturer shall provide a product warranty for a period of not less than five (5) years for switchboards, panelboards, and individual equipment TVSS units. Manufacturer shall provide a product warranty for a period of not less than five (5) years for telecommunication and data TVSS units.

B. The first five (5) years of this warranty will include the labor to field replace modules or the labor required to remove, repair and reinstall the TVSS device.

PART 2 PRODUCTS

2.1 TVSS - SERVICE ENTRANCE

A. Manufacturers

1. Liebert Interceptor
2. Square D
3. Siemens
4. General Electric

B. Circuit configuration of the suppresser shall be thermal stress reducing, custom parallel, and solid state. All suppression circuits shall be totally encapsulated by the manufacturer in a thermally conductive chemical compound. All materials used as a component or encapsulant shall be in conformance with The Federal Clean Air Act Amendments of 1990, Section 602 and 611, prohibiting the use of Class I or Class II ozone depleting chemicals.

C. Enclosure: steel, NEMA 4, weatherproof.

D. Protection modes: Dedicated, Dedicated Line-to-neutral, Dedicated Line-to-ground, and Dedicated Neutral-to-ground.

E. Provide fusible or integral disconnect.

F. Response Time: Less than 1 nanosecond.

G. Provide LED indicators, one per phase to alert loss of protection.

H. Peak Surge Current: 150 kA per mode of protection.

2.2 TVSS - DISTRIBUTION SWITCHBOARDS

A. Circuit configuration of the suppresser shall be thermal stress reducing, custom parallel, and solid state. All suppression circuits shall be totally encapsulated by the manufacturer in a thermally conductive chemical compound. All materials used as a component or encapsulant shall be in conformance with The Federal Clean Air Act Amendments of 1990, Section 602 and 611, prohibiting the use of Class I or Class II ozone depleting chemicals.

B. Enclosure: NEMA 4, weatherproof.

D. Provide fusible disconnect or breaker in panelboard for TVSS connection.

E. Response Time: Less than 1 nanosecond.

F. Provide LED indicators, one per phase to alert loss of protection.

G. Peak Surge Current: 80 kA per mode of protection.

2.3 TVSS - PANELBOARDS AND FIRE ALARM PANELS

A. Circuit configuration of the suppresser shall be thermal stress reducing, custom parallel, and solid state. All suppression circuits shall be totally encapsulated by the manufacturer in a thermally conductive chemical compound. All materials used as a component or encapsulant shall be in conformance with The Federal Clean Air Act Amendments of 1990, Section 602 and 611, prohibiting the use of Class I or Class II ozone depleting chemicals.

B. Enclosure: NEMA 4, weatherproof.


D. Sine Wave Tracking: Suppresser to have active sine wave tracking technology of the voltage waveform.

E. Provide fusible disconnect or breaker in panelboard for TVSS connection.

F. Response Time: Less than 1 nanosecond.

G. Provide LED indicators, one per phase to alert loss of protection.

H. Peak Surge Current: 80 kA per mode of protection.

PART 3 EXECUTION

3.1 INSTALLATION

A. Verify the proper application of the TVSS (i.e. voltage, phases, etc.) and coordinate with upstream and downstream transient suppression. Verify that all Neutral conductors are bonded to the system Ground at the service entrance or the serving isolation transformer prior to installation of the associated TVSS.

B. Provide all labor, materials, equipment and services necessary for and incidental to the installation of the TVSS system components as specified herein. Only licensed electricians shall install TVSS units.

C. Provide the transient voltage surge suppressors as indicated in manufacturer’s installation instructions and in accordance with the applicable portions of NEC.
and in accordance with recognized industry practices to ensure that product complies with requirements. NEC, State, and Local Codes will prevail.

D. Install in accordance with manufacturer’s instructions.

E. Connect TVSS leads with minimum conductor length and rounded-radius bends with no sharp turns.

END OF SECTION
SECTION 265668 - SPORTS FIELD LIGHTING SYSTEMS
PART 1 GENERAL

SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.

B. The purpose of specification is to define the lighting system performance and design standards for The NCAA Sand Volleyball Complex located at EKU Athletics using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.

C. The sports lighting will be for the following venues: Volleyball 1,2,3

D. The Controls for the sports lighting will be:

   1. Volleyball 1-3: Through local manual external push button control on the Sports Lighting Contactor Panel which gives the player activated user control for a timed cycle (programmable by the Owner, factory set at 8 hours) of light on the Volleyball Courts and will flash the lights 5 minutes before automatically turning them off, until the local manual operator switches are turned on again. Finally, the manual operator switches shall be overridden by the Sports Lighting Control Schedule so that the Volleyball Lights are not operable each night after a determined time (factory set at midnight).

E. The primary goals of this sports lighting project are:

   1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore light levels are guaranteed to not drop below specified target values for a period of ten (10) years, which shall be warrantied by the Contractor.

   2. Environmental Light Control: One of the primary goals of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors.

F. All lighting shall comply with NCAA Lighting Standards.

E. LIGHTING PERFORMANCE - Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.
F. Hours of usage: Designs shall be based on the following hours of usage

<table>
<thead>
<tr>
<th>Area of Lighting</th>
<th>Annual Usage Hours</th>
<th>10 year Usage Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennis 1-3</td>
<td>700</td>
<td>7000</td>
</tr>
</tbody>
</table>

G. Color: The lighting system shall have a minimum color temperature of 5700K and a minimum CRI of 75.

H. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below.

<table>
<thead>
<tr>
<th># of Poles</th>
<th>Pole Designation</th>
<th>Pole Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>P1-P2</td>
<td>40'</td>
</tr>
</tbody>
</table>

1.2 ENVIRONMENTAL LIGHT CONTROL

A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.

B. Spill Scans: Spill scans must be submitted to the Engineer for approval, indicating the amount of horizontal and vertical foot-candles. Light levels shall be taken at 10-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights. Illumination level shall be measured in accordance with the IESNA LM-5-04 after 1 hour warm up.

C. The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to the Engineer to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified independent testing laboratory with a minimum of five years experience or by a manufacturer’s laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

1.3 INSTALLATION

A. Manufacturer’s Instructions: Written instructions for the installation of the sports lighting equipment shall be provided by the manufacturer. The contractor shall review the instructions prior to beginning installation and review any areas of concern with the manufacturer.

B. Installation of Equipment: Contractor shall install lighting equipment per manufacturer’s stated requirements to ensure lighting performance is achieved.

C. Poles must be installed per the stamped structural design.
D. Manufacturer Representative: A qualified representative from the sports lighting manufacturer shall provide installation guidance required by the contractor.

E. Handling of Equipment: The lighting equipment shall be handled in an appropriate manner to ensure safe installation and prevent damage to the equipment. Repair or replacement of damaged component shall be the responsibility of the installing contractor.

F. Rigging: Use the appropriate rated web fabric slings to lift components into position. Chains or cables shall not be allowed due to potential failure and damage to components.

PART 2 – PRODUCT

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All LED luminaires, wire harnesses, LED drivers and other enclosures shall be factory assembled, aimed, wired and tested.

B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

C. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and cross-arm assembly.
   a. Direct bury steel, steel stub and concrete poles will not be accepted.
   b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.

2. LED Lighting systems shall use concrete foundations. See Section 2.3 for details.
   a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
   b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-inforced pier design pole erection may occur
after 7 days. Or after a concrete sample from the same batch achieves a certain strength.

3. Manufacturer will supply all LED drivers and supporting electrical equipment
   a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. Drivers located at the top of the pole will not be allowed. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.

4. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.

5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.

6. All LED luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.

7. Control cabinet to provide remote on-off control of the lighting system. See Section 2.4 for further details.

8. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
   a. Integrated grounding via concrete encased electrode grounding system.
   b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

A. Electric Power Requirements for the Sports Lighting Equipment:
   1. Electric power: 240 Volt, 1 Phase
   2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

B. Energy Consumption: The maximum kW consumption for the field lighting system shall be 4640 Watts.

2.3 STRUCTURAL PARAMETERS
A. Wind Loads: Wind loads shall be based on the 2018 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 130 MPH and exposure category C.


C. Foundation Design: The foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2018 IBC Table 1806.2.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

2.4 CONTROL

A. Instant On/Off Capabilities: System shall provide for instant on/off of LED luminaires.

B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.

C. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site or cellular phone up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

   The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute "early off" commands by phone. Scheduling tool shall be capable of setting curfew limits.

   Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.
PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL
A. It shall be the Contractor’s responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner’s approval / payment for additional costs associated with:
   1. Providing engineered foundation embedment design by a registered engineer in the State of Kentucky for soils other than specified soil conditions;
   2. Additional materials required to achieve alternate foundation;
   3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING
A. Delivery Timing Equipment On-Site: The equipment must be on-site 6 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL
A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.

B. Field Light Level Accountability
   1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 10 Years.
   2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner’s light meter in the presence of the owner.
   3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including foot-candles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 TEN (10) YEAR WARRANTY AND GUARANTEE
A. Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 10 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism...
or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

PART 4 – DESIGN APPROVAL

4.0 MANUFACTURERS

A. Approved Product: Musco’s Light-Structure System™ with TLC for LED™, is the Basis of Design.

B. All substitutions must provide a complete submittal package for approval at least 7 days prior to bid.

END OF SECTION 265668
SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes the following:
      1. Removing existing grass.
      2. Clearing and grubbing.
      3. Removing above- and below-grade site improvements.
      4. Disconnecting, capping or sealing, and abandoning site utilities in place and removing site utilities.
      5. Temporary erosion and sedimentation control measures.

   B. Related Sections include the following:
      1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
      2. Division 23 Section “Turf and Grasses” for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

1.3 DEFINITIONS
   A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; 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 more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

1.4 MATERIAL OWNERSHIP
   A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS
   A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

   B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.
1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT 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 traffic ways if required by authorities having jurisdiction. See site layout plans for temporary walkways and construction fence locations.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing. Call 811

E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."

   1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. 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. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and Grading and Erosion Control Drawings. All erosion control shall comply with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

B. Inspect, repair, and maintain 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 UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than three (3) days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

D. Excavate for and remove underground utilities indicated to be removed.

E. Removal of underground utilities is included in multiple Sections covering site utilities.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, grass, and other vegetation to permit installation of new construction.

1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
2. Remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
3. Use only hand methods for grubbing within tree protection zone.

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.
3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as 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 length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.6 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

   1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling area.

END OF SECTION 311000
SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Preparing subgrades for walks, pavements, lawns, and grasses.
   2. Subbase course for concrete walks and pavements.
   3. Subbase and base course for asphalt paving.
   4. Excavating and backfilling for utility trenches.

B. Related Sections include the following:
   1. Division 01 Sections "Construction Progress Documentation" and “Photographic Documentation" for recording preexcavation and earthwork progress.
   2. Division 03 Section "Cast-in-Place Concrete" for vapor retarder beneath the slab-on-grade.
   3. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
   4. Division 32 Section "Turf and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.

1.3 UNIT PRICES

A. Unit prices for earthwork are included in the “Form of Proposal.”

B. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
   1. 24 inches outside of concrete forms other than at footings.
   2. 12 inches outside of concrete forms at footings.
   3. 6 inches beneath bottom of concrete slabs-on-grade.

1.4 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: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course 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: Course 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.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.

3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footings, trenches, and pits excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent geotechnical testing agency, according to ASTM D 1586.

J. Structures: curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

K. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

M. Utilities: On-site underground pipes, conduits, ducts, and cables.

1.5 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.

2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.

B. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

C. Samples:

1. 1 gallon bucket of Volleyball Court Sand.

1.6 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
B. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

C. Special Inspector Qualifications: Comply with Division 01 Section “Special Inspections.”

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Architect not less than five days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

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: ASTM D 2487 Soil Classification Groups GW, CL, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups. This also includes material deemed as Fat Clay.
   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; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

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 0 to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand. (NOT VOLLEYBALL COURT SAND)
K. Impervious Fill: Clay capable of compacting to a dense state.
L. Volleyball Court Sand: Sand must meet FIVB and NCAA requirements.
   1. Naturally weathered.
   2. Sub angular or rounded.
   3. Not be acquired from a crushed rock source.
   4. Free of organic material.
   5. Particle size Requirements:

<table>
<thead>
<tr>
<th>Name</th>
<th>Particle Diameter</th>
<th>Spec. (% ret. on sieves)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine gravel</td>
<td>2.0 mm</td>
<td>0%</td>
</tr>
<tr>
<td>Very coarse sand</td>
<td>1.0 mm – 2.0 mm</td>
<td>0% - 6%</td>
</tr>
<tr>
<td>Coarse sand</td>
<td>0.5 mm – 1.0 mm</td>
<td>Minimum of 80%</td>
</tr>
<tr>
<td>Medium sand</td>
<td>0.25 mm – 0.5 mm</td>
<td>Maximum of 92%</td>
</tr>
<tr>
<td>Fine sand</td>
<td>0.15 mm – 0.25 mm</td>
<td>7% - 18%</td>
</tr>
<tr>
<td>Very fine sand</td>
<td>0.05 mm – 0.15 mm</td>
<td>Not greater than 2.0%</td>
</tr>
<tr>
<td>Silt and clay</td>
<td>Below 0.05 mm</td>
<td>Not greater than 0.15%</td>
</tr>
</tbody>
</table>

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.
   2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
   3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
   4. Tear Strength: 56 lbf; ASTM D 4533.
   5. Puncture Strength: 56 lbf; ASTM D 4833.
   6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
   7. Permittivity: 0.2 per second, minimum; ASTM D 4491.
   8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
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. Grab Tensile Strength: 247 lbf; ASTM D 4632.
   3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
   4. Tear Strength: 90 lbf; ASTM D 4533.
   5. Puncture Strength: 90 lbf; ASTM D 4833.
   6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
   7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
   8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL
A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:
   1. Portland Cement: ASTM C 150, Type II or III.
   2. Fly Ash: ASTM C 618, Class C or F.
   5. Water: ASTM C 94/C 94M.
B. Produce low-density, controlled low-strength material with the following physical properties:
   1. As-Cast Unit Weight: 36 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
2. Compressive Strength: 100 psi, when tested according to ASTM C 495.

C. Produce conventional-weight, controlled low-strength material with 100 psi compressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
   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 earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

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. 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.
   2. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. DO NOT USE EXPLOSIVES

3.4 EXCAVATION, GENERAL

A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate earth or rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for earth or rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation only.
1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. 6 inches beneath bottom of concrete slabs on grade.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS
   A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.6 SUBGRADE INSPECTION
   A. Notify Architect and Special Inspector when excavations have reached required subgrade.
   B. If Architect and Special Inspector determine that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   C. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Proof roll in presence of approved Geotechnical Testing Agency.
      1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
      2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
      3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Approved Geotechnical Testing Agency and replace with compacted backfill or fill as directed.
   D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
   E. Reconstruct subgrades damaged by rain, accumulated water, or construction activities, as directed by Architect and Approved Geotechnical Testing Agency without additional compensation.

3.7 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. Cover to prevent windblown dust.
      1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 BACKFILL
   A. Place and compact backfill in excavations promptly, but not before completing the following:
      1. Surveying locations of underground utilities for Record Documents.
      2. Testing and inspecting underground utilities.
      3. Removing concrete formwork.
      4. Removing trash and debris.
   B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 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. 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. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

D. Provide concrete unit masonry blocking to support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit on all sides with a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.

G. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

H. Place and compact final backfill of satisfactory soil to final subgrade elevation.

I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

J. Install detectable warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 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 and compact fill material in layers to required elevations as follows:
   1. Under grass areas, use satisfactory soil material.
   2. Under walks and service area pavements, use satisfactory soil material.

C. Place soil fill on subgrades free of mud.

3.11 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.
   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.

3.12 COMPACATION 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. For all structures, including pavements, scarify and recompact top 8 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent underneath structure and a minimum of 10 feet (3.048 mm) beyond structure footprint.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
   4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 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.

3.14 SUBSURFACE DRAINAGE
A. Subdrainage Pipe: Specified in Division 33 Section "Subdrainage."
B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
   1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
   1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
   2. Place and compact impervious fill over drainage backfill in 6-inch-thick compacted layers to final subgrade.

3.15 SUBBASE AND BASE COURSES
A. Place subbase and base course on subgrades free of mud.
B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
   1. Install separation geotextile on prepared subgrade according to manufacturer’s written instructions, overlapping sides and ends.
   2. Place base course material over subbase course under hot-mix asphalt pavement.
   3. Shape subbase and base course to required crown elevations and cross-slope grades.
   4. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
   5. Place subbase 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.
   6. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.16 DRAINAGE COURSE
A. Place drainage course on subgrades free of mud, frost, snow, or ice.
B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
   2. Place drainage course 6 inches or less in compacted thickness in a single layer.
   3. Place drainage 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.
   4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.17 FIELD QUALITY CONTROL
A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork 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 when approved by Architect.
D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, 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 1 test for every 2000 sq. ft. or less of paved area, but in no case fewer than 3 tests.
   2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 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 to depth required; recompact and retest until specified compaction is obtained.

3.18 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 Architect or Geotechnical Testing Agency; reshape and re-compact.
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.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS
A. Disposal: Transport surplus satisfactory and unsatisfactory soil to designated storage areas on Owner's property. Spread soil as directed by Architect.
   1. Remove waste material, including trash, and debris, and legally dispose of it off Owner's property.
END OF SECTION 312000
SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes construction dewatering.

B. Related Sections:

1. Division 01 Section "Construction Progress Documentation and Photographic Documentation" for recording preexisting conditions and dewatering system progress.
2. Division 31 Section "Earth Moving" for excavating, backfilling, site grading, and for site utilities.
3. Division 33 Section "Subdrainage" for permanent foundation wall, underfloor, and footing drainage.

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

1.4 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer specializing in civil or geotechnical engineering and registered in the Commonwealth of Kentucky, responsible for their preparation.

C. Qualification Data: For qualified Installer and professional engineer.

D. Field quality-control reports.

E. Other Informational Submittals:
   1. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to dewatering including, but not limited to, the following:
      a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
      b. Geotechnical report.
      c. Proposed site clearing and excavations.
      d. Existing utilities and subsurface conditions.
      e. Coordination for interruption, shutoff, capping, and continuation of utility services.
      f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      g. Testing and monitoring of dewatering system.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
1. Notify Construction Manager no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Construction Manager's written permission.

B. 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 will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
2. The geotechnical report is included elsewhere in the Project Manual.

C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

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 dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate dewatering and control of surface water.
D. Monitor dewatering systems continuously.

E. Promptly repair damages to adjacent facilities caused by dewatering.

F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing" during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 36 inches below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.
FIELD QUALITY CONTROL

A. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

END OF SECTION 312319
SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Hot-mix asphalt patching.
   2. Hot-mix asphalt paving.

B. Related Sections:
   1. Division 2 Section "Site Clearing" for demolition, removal, and recycling of existing asphalt pavements.
   2. Division 2 Section "Earth Moving" for aggregate subbase and base courses.
   3. Division 2 Section “Pavement Markings” for pavement stripping and symbols.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
   1. Job-Mix Designs: For each job mix proposed for the Work.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples: For each paving fabric, 12 by 12 inches minimum.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
   1. Each paving fabric, 12 by 12 inches minimum.
   2. Each type and color of preformed traffic-calming device.
   3. Each pattern and color of precut marking material.

E. Qualification Data: For qualified manufacturer and Installer.
F. Material Certificates: For each paving material, from manufacturer.

G. Material Test Reports: For each paving material.

1.5 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT.

2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT 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 65 deg F.
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 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: KYTC Section 805, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.

C. Fine Aggregate: KYTC Section 804, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.

D. Mineral Filler: KYTC Section 804, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Cement: KYTC Section 806.

B. Prime Coat: KYTC Section 806.

C. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

2. Provide the maximum allowable recycled asphalt content as permitted by the KYTC Standard Specifications for the applicable mix.

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. Do not proof-roll wet or saturated subgrades.
1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

D. Verify that utilities and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

3.4 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 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. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
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.

3.6 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.

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

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.

3.7 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.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION
SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes exterior cement concrete pavement for the following:
      1. Walkways & Service Drive.
   B. Related Sections include the following:
      1. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
      2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS
   A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS
   A. Product Data: For each type of manufactured material and product indicated.
   B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   C. Qualification Data: For manufacturer and testing agency.
   D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
      1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

F. Field quality-control test reports.

G. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.


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

E. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

1. Notify Architect seven days in advance of dates and times when mockups will be constructed.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 150 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.


C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

D. Deformed-Steel Wire: ASTM A 496.

E. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete.

G. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use one of the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type I/II, white.
   a. Fly Ash: ASTM C 618, Class C or F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, uniformly graded. Provide aggregates from a single source with documented service record data of at least 7 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.


E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 CURING MATERIALS

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

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
   1. Products:
      a. Axim Concrete Technologies; Cimfilm.
      b. Burke by Edeco; BurkeFilm.
      c. ChemMasters; Spray-Film.
      d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
      e. Dayton Superior Corporation; Sure Film.
      f. Euclid Chemical Company (The); Eucobar.
      g. Kaufman Products, Inc.; Vapor Aid.
      h. Lambert Corporation; Lambco Skin.
      i. L&M Construction Chemicals, Inc.; E-Con.
      j. MBT Protection and Repair, ChemRex Inc.; Confilm.
      l. Metalcrete Industries; Waterhold.
      m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
      n. Sika Corporation, Inc.; SikaFilm.
      o. Symons Corporation; Finishing Aid.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
   1. Products:
      a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
      b. Burke by Edoko; Aqua Resin Cure.
      c. ChemMasters; Safe-Cure Clear.
      d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
      e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
      f. Euclid Chemical Company (The); Kurez DR VOX.
      g. Kaufman Products, Inc.; Thinfilm 420.
      h. Lambert Corporation; Aqua Kure-Clear.
      i. L&M Construction Chemicals, Inc.; L&M Cure R.
      k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
      l. Symons Corporation; Resi-Chem Clear.
      m. Tamms Industries Inc.; Horncure WB 30.
      n. Unitex; Hydro Cure 309.
      o. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
   1. Products:
      a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
      b. Burke by Edeco; Resin Emulsion White.
d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
g. Kaufman Products, Inc.; Thinfilm 450.
h. Lambert Corporation; Aqua Kure-White.
i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
k. Symons Corporation; Resi-Chem White.
l. Tamms Industries, Inc.; Horncure 200-W.
m. Unitex; Hydro White.
n. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
   1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:
   2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
   3. Slump Limit: 4 inches, plus or minus 1/2 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
   1. Air Content: 6 percent plus or minus 1.0 percent for 1-1/2-inch nominal maximum aggregate size.
   2. Air Content: 6 percent plus or minus 1.0 percent for 1-inch nominal maximum aggregate size.
   3. Air Content: 6 percent plus or minus 1.0 percent for 3/4-inch nominal maximum aggregate size.

D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use high-range, water-reducing and retarding admixture in concrete, as required, for placement and workability.

E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals as follows:
   1. Fly Ash or Pozzolan: 25 percent.
   2. Ground Granulated Blast-Furnace Slag: 50 percent.
   3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
2.7  CONCRETE MIXING

A.  Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.

1.  When air temperature is between 85 deg F 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.

B.  Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1.  For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2.  For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3.  Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

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 below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1.  Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2.  Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
3.  Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."

C.  Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2  PREPARATION

A.  Remove loose material from compacted subbase surface immediately before placing concrete.
3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement 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 STEEL REINFORCEMENT

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

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Butt Joints: Use bonding agent or epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at a maximum distance of 50 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. 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.

C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

D. Do not add water to concrete during delivery or at Project site.

E. 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, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

I. Screed pavement surfaces with a straightedge and strike off.

J. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

K. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water 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.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive hot temperatures.

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

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recot areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 0 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days, 1 specimen at 14 days and 2 specimens at 28 days.
   a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 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.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain 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.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

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

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313
SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Expansion and contraction joints within cement concrete pavement.
   2. Joints between cement concrete and asphalt pavement.

B. Related Sections include the following:
   1. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.
   2. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
   3. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples 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. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

D. Qualification Data: For Installer.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.
1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than 5 pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the Notice to Proceed with the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT 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.
2. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
3. When joint substrates are wet or covered with frost.
4. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 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.

B. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

A. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, & uses indicated:

1. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
   a. Products:
      1) Pecora Corporation; Urexpan NR-300.

2. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
   a. Products:

3. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
   a. Products:
      1) Tremco Sealant/Waterproofing Division; Vulkem 202.

B. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

1. Products:
C. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

1. Products:
   a. Crafco Inc.; RoadSaver Silicone.
   b. Dow Corning Corporation; 888.

D. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.

1. Products:
   a. Crafco Inc.; RoadSaver Silicone SL.
   b. Dow Corning Corporation; 890-SL.

E. Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer and activator components producing a pourable, self-leveling sealant.

1. Products:

2.4 HOT-APPLIED JOINT SEALANTS

A. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.

1. Products:

2.5 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied 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 Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
2.6 PRIMERS
A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

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. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support 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 backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for 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 Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below 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 sealants from surfaces adjacent to joint.
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.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. 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 with repaired areas are indistinguishable from the original work.

END OF SECTION 321373
SECTION 321723 – PAVEMENT MARKINGS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes painted markings applied to asphalt pavement.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to marking pavement including, but not limited to, the following:
      a. Pavement aging period before application of pavement markings.
      b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include technical data and tested physical and performance properties.
B. Shop Drawings: For pavement markings.
   1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
   2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE
A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of EKU for pavement-marking work.
   1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS
A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials and 55 deg F for water-based materials, and not exceeding 95 deg F.
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:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Aexcel Inc.
2. Benjamin Moore & Co.
5. Conco Paints.
6. Coronado Paint; Division of INSL-X Products Corporation.
10. General Paint.
16. PPG Industries.
17. Pratt & Lambert.
18. Rodda Paint Co.
19. Rohm and Haas Company; a subsidiary of The Dow Chemical Company.
20. Scott Paint Company.

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

1. Color: All colors as indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to 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 Architect.

C. Allow paving to age for a minimum of 3 days before starting pavement marking.

D. Sweep and clean surface to eliminate loose material and dust.
F. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer’s recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

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 321723
SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Decorative metallic-coated-steel tubular picket fences.
   2. Decorative steel fences.
   3. Decorative aluminum fences.
   4. Swing gates.
   5. Horizontal-slide gates.
   6. Gate operators, including controls.

B. Related Requirements:
   1. Section 033053 "Miscellaneous Cast-in-Place Concrete" for concrete gate bases and posts.
   2. Division 31 Section "Earth Moving" for site excavation, fill, and backfill where decorative metal fences and gates are located.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fencing and gates.
   1. Include plans, elevations, sections, gate locations, post spacing, and mounding details.

C. Samples: For each fence material and for each color specified.
   1. Provide Samples 24” in length (or standard manufacturer sample) for linear materials.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For gate operators to include in maintenance manuals.
1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Mockups: Build mockups to set quality standards for fabrication and installation.
   1. Include 8-foot (1 panel and 2 posts) length of fence complying with requirements.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind Loading:
   1. Fence Height: 6’
   2. Design Wind Speed: 125 MPH
   3. Design Wind Pressure: 40 PSF

2.2 DECORATIVE METALLIC-COATED-STEEL TUBULAR PICKET FENCES

A. Decorative Metallic-Coated-Steel Tubular Picket Fences: Comply with ASTM F2408 for commercial application (class) unless otherwise indicated.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Ameristar Fence Products; an ASSA ABLOY company; “Montage Commercial" or comparable product by one of the following:
   a. BetaFence USA LLC.
   b. Builders Fence Company, Inc.
   c. Fortress Iron.
   d. Iron Eagle Industries, Inc.
   e. Master Halco.
   f. Merchants Metals.
   g. Virginia Railing and Gates, LLC.

C. Posts:
   1. Line Posts: Square tubes 2 by 2 inches formed from 0.079-inch nominal-thickness, metallic-coated steel sheet or formed from 0.075-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication.
   2. End and Corner Posts: Square tubes 3 by 3 inches formed from 0.108-inch nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication.
D. Post Caps: Formed from steel sheet and hot-dip galvanized after forming.

E. Rails: Square tubes.
   1. Size: 1-3/8 by 1-1/2 inches or 1-1/2 by 1-1/2 inches.
   2. Metal and Thickness: 0.079-inch nominal-thickness, metallic-coated steel sheet or 0.075-inch nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.

F. Fasteners: Manufacturer's standard tamperproof, corrosion-resistant, color-coated fasteners matching fence components with resilient polymer washers or clips.

G. Galvanizing: For components indicated to be galvanized and for which galvanized coating is not specified, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

H. Finish: Powder coating.

2.3 SWING GATES

A. Gate Configuration: As indicated.

B. Gate Frame Height: As indicated.

C. Gate Opening Width: As indicated.

D. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes 2 by 2 inches formed from 0.108-inch nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication.

E. Frame Corner Construction: Welded or assembled with corner fittings and 5/16-inch- diameter, adjustable truss rods for panels 5 feet wide or wider.

F. Additional Rails: Provide as indicated, complying with requirements for fence rails.

G. Infill: Comply with requirements for adjacent fence.

H. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide. Provide center gate stops and cane bolts for pairs of gates. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

I. Spring Hinges: BHMA A156.17, Grade 1, suitable for exterior use.
   1. Function: 320 - Gate spring pivot hinge. Adjustable tension.


K. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay.
L. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M unless otherwise indicated. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.

M. Steel Finish: Manufacturer’s factory finish.

2.4 STEEL FINISHES

A. Surface Preparation: Clean surfaces according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

B. Powder Coating: Immediately after cleaning, apply 2-coat finish consisting of epoxy primer and TGIC polyester topcoat, with a minimum total dry film thickness of not less than 8 mils. Comply with coating manufacturer's written instructions.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

C. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils per applied coat, to surfaces that will be exposed after assembly and installation, and to concealed surfaces.

   1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

C. 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.
   1. Construction layout and field engineering are specified in Division 01 Section "Execution"
3.3 DECORATIVE FENCE INSTALLATION

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening rails and infill panels to posts. Peen threads of bolts after assembly to prevent removal.

C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.

D. 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 and sleeves and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
      a. Exposed Concrete: Extend 2 inches above grade. Finish and slope top surface to drain water away from post.
   3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.

3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.5 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.

END OF SECTION 323119
SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Sodding.
      2. Erosion-control material(s).
   B. Related Sections:
      1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
      2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS
   A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
   B. Finish Grade: Elevation of finished surface of planting soil.
   C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
   D. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
   E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
   F. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
   G. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
H. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Qualification Data: For qualified landscape Installer.

B. Existing topsoil testing results by Qualified Testing Lab for recommended soil amendments.

C. Product Certificates: For soil amendments and fertilizers, from manufacturer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

   a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
   b. Certified Turfgrass Professional, designated CTP.
   c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.

5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

B. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

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 fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Not Applicable for this project schedule

B. 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.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Sodded Turf: Until project completion and fence construction fence removal.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Full Sun to Shade: 3-4 way blend of turf type tall fescue, a minimum of three cultivars.

2. Sods grown from acceptable cultivars:
   a. Regenerate
   b. Grade 3
   c. Hemi
   d. Bizem
   e. Fesnova
2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
   2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
   3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
2.5 PLANTING SOILS

A. Planting Soil Zone (See Plans): Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with another specified planting soil when quantities are insufficient.
2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
   b. Weight of Lime per 1000 Sq. Ft.: As per soil analysis
   c. Weight of Commercial Fertilizer per 1000 Sq. Ft.: 1 lb.
   d. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: 1 lb.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.
B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
   b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.
D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.6 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf
growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass to a height of 2 1/2 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.7 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200
SECTION 329300 – PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Shrubs

B. Related Sections:
1. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Division 32 Section "Turf and Grasses" for lawn.
4. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated; wrapped, tied, rigidly supported, and drum laced as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with 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 exterior plant required.

D. Finish Grade: Elevation of finished surface of planting soil.

E. Multi-Stem: Where three or more main stems arise from the ground from a single root crown or at a point right above the root crown.

F. Planting Soil: Native or imported topsoil, mixed with soil amendments.
G. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For qualified landscape Installer.

C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis for standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Material Test Reports: For existing surface soil and imported topsoil.

E. Planting Schedule: Indicating anticipated planting dates for exterior plants.

F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent 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.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
1. Selection of exterior plants purchased under allowances will be made by Architect, who will tag plants at their place of growth before they are prepared for transplanting.

E. Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes.

F. Observation: Architect may observe shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to observe shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver exterior plants freshly dug.

1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

B. Do not prune shrubs before delivery except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery and handling.

C. Handle planting stock by root ball.

D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants in shade, protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

2. Do not remove container-grown stock from containers before time of planting.

3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.


2. Fall Planting: October 15th to December 15th.
B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed according to manufacturer's written instructions and warranty requirements.

C. Coordination with Lawns: Plant shrubs after finish grades are established and before planting lawns unless otherwise acceptable to Architect.

   1. When planting shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer's standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

   1. Failures include, but are not limited to, the following:

      a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
      b. Structural failures including plantings falling or blowing over.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

   2. Warranty Periods from Date of Substantial Completion:

      a. Shrubs: One year.

   3. Include the following remedial actions as a minimum:

      a. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
      b. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
      c. A limit of one replacement of each exterior plant will be required except for losses or replacements due to failure to comply with requirements.
      d. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Shrubs and Plants: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than 60 days past the date of Project Substantial Completion.
PART 2 - PRODUCTS

2.1 SHRUB MATERIAL

A. General: Furnish nursery-grown shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Provide shrubs of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of shrubs required. Shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Label each shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

E. If formal arrangements or consecutive order of shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.2 DECIDUOUS SHRUBS

A. Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

1. Shrub sizes indicated are sizes after pruning.
2. Provide balled and burlapped or container-grown shrubs as indicated.

2.3 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Stones shall not exceed 10% by volume.

1. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.4 INORGANIC SOIL AMENDMENTS

A. Aluminum Sulfate: Commercial grade, unadulterated.
2.5 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Manure: Well-rotted, composted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.6 FERTILIZER

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.7 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of shrubs, consisting of one of the following:

1. Type: Cedar Bark Chunks

2.8 MISCELLANEOUS PRODUCTS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

2.9 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

3. Weight of Aluminum Sulfate per 1000 Sq. Ft.: As recommended by soil test.
4. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: As recommended by soil test.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting. Make minor adjustments as required.

D. Lay out exterior plants at locations directed by Architect. Stake locations of individual and outline areas for multiple plantings.

E. Apply antidesiccant to shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   1. If deciduous shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING BED ESTABLISHMENT

A. Loosen subgrade of planting beds to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.

2. Spread planting soil mix to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil mix.

B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, restore planting beds if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR SHRUBS

A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
   1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.

B. Subsoil removed from excavations may not be used as backfill.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to shrubs are encountered in excavations.
   1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in shrub pits.

E. Fill excavations with water and allow to percolate away before positioning shrubs.

3.5 SHRUB PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.

B. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

C. Set container-grown stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.

   1. Carefully remove root ball from container without damaging root ball or plant.
   2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

D. Organic Mulching: Apply 2-inch minimum thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.

3.6 SHRUB PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape shrubs according to standard horticultural practice. Prune shrubs to retain natural character.

3.7 PLANTING BED MULCHING

A. Mulch backfilled surfaces of planting beds and other areas indicated.

   1. Organic Mulch: Apply 2-inch minimum thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.8 PLANT MAINTENANCE

A. Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep shrubs free of insects and disease.

B. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.
3.9 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.10 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 329300
SECTION 330500 – COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes the following:
   1. Piping joining materials.
   2. Transition fittings.
   3. Sleeves.
   4. Identification devices.
   5. Grout.
   6. Flowable fill.
   7. Piped utility demolition.
   8. Piping system common requirements.
   9. Equipment installation common requirements.
  10. Concrete bases.
  11. Metal supports and anchorages.

1.3 DEFINITIONS
A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
C. CPVC: Chlorinated polyvinyl chloride plastic.
D. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS
A. Product Data: For the following:
   1. Dielectric fittings.
   2. Identification devices.

1.5 INFORMATIONAL SUBMITTALS

1.6 DELIVERY, STORAGE, AND HANDLING
A. Deliver pipes and tubes 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.
B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
      a. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
   2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.


G. Solvent Cements for Joining Plastic Piping:
   1. CPVC Piping: ASTM F 493.
   2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.2 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings NPS 1-1/2 and Smaller:
   1. Underground Piping: Manufactured piping coupling or specified piping system fitting.

C. AWWA Transition Couplings NPS 2 and Larger:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      b. Dresser, Inc.; DMD Div.
      c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
      d. JCM Industries.
      e. Smith-Blair, Inc.
      f. Viking Johnson.
   2. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Spears Manufacturing Co.

2. Description: CPVC and PVC one-piece fitting with manufacturer’s Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint or threaded end.

E. Plastic-to-Metal Transition Unions:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. NIBCO INC.
      b. Spears Manufacturing Co.
   2. Description: MSS SP-107 CPVC and PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      b. Fernco, Inc.
      d. Plastic Oddities.
   2. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 DIELECTRIC FITTINGS
   A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
   B. Dielectric Unions:
      1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         a. Capitol Manufacturing Co.
         b. Central Plastics Company.
         c. Epco Sales, Inc.
         e. Watts Water Technologies, Inc.
         f. Zurn Plumbing Products Group; Wilkins Div.
      2. Description: Factory fabricated, union, NPS 2 (DN 50) and smaller.
         a. Pressure Rating: 150-psig minimum
b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Capitol Manufacturing Co.
   b. Central Plastics Company.
   c. Epeo Sales, Inc.
   d. Watts Water Technologies, Inc.
3. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
   b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Central Plastics Company.
   d. Pipeline Seal and Insulator, Inc.
2. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.
   a. Pressure Rating: 250 psig minimum.
   b. Gasket: Neoprene or phenolic.
   c. Bolt Sleeves: Phenolic or polyethylene.
   d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Calpico, Inc.
   b. Lochinvar Corporation.
2. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
   a. Pressure Rating: 300 psig at 225 deg F.
   b. End Connections: Threaded.

F. Dielectric Nipples:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Perfection Corporation.
   b. Precision Plumbing Products, Inc.
   c. Victaulic Company.

2. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
   a. Pressure Rating: 300 psig at 225 deg F.
   b. End Connections: Threaded or grooved.

2.4 SLEEVES
   A. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
   B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
   C. Cast-Iron Sleeves: Cast or fabricated “wall pipe” equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
   D. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
   E. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
   F. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.5 IDENTIFICATION DEVICES
   A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer’s option.
   B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
      1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
      2. Location: Accessible and visible.
   C. Snap-on Plastic Pipe Markers: Manufacturer’s standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
   D. Pressure-Sensitive Pipe Markers: Manufacturer’s standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
   E. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
   F. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
   G. Lettering: Manufacturer’s standard preprinted captions as selected by Architect.
   H. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
      1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
I. Plastic Tape: Manufacturer’s standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
   1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
   2. Color: Comply with ASME A13.1, unless otherwise indicated.

J. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
   1. Material: 0.032-inch-thick, polished brass or aluminum.
   2. Material: 0.0375-inch-thick stainless steel.
   4. Material: Valve manufacturer’s standard solid plastic.
   5. Size: 1-1/2 inches in diameter, unless otherwise indicated.
   6. Shape: As indicated for each piping system.

K. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

L. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
   1. Engraving: Engraver’s standard letter style, of sizes and with terms to match equipment identification.
   2. Thickness: 1/16 inch (1.6 mm), unless otherwise indicated.
   3. Thickness: 1/16 inch (1.6 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3 mm) for larger units.
   4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.

2.6 GROUT
   A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
      2. Design Mix: 5000-psi, 28-day compressive strength.

2.7 FLOWABLE FILL
   A. Description: Low-strength-concrete, flowable-slurry mix.
      3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
      6. Water: Comply with ASTM C 94/C 94M.
      7. Strength: 100 to 200 psig at 28 days.
PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION
   A. Refer to Section 01732 “Selective Demolition” for general demolition requirements and procedures.
   B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
      1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
      2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
      3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
      4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
      5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
   C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 DIELECTRIC FITTING APPLICATIONS
   A. Wet Piping Systems: Connect piping of dissimilar metals with the following:
      1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
      2. NPS 2-1/2 to NPS 4: Dielectric nipples.
      3. NPS 2-1/2 to NPS 8: Dielectric flange kits.

3.3 PIPING INSTALLATION
   A. Install piping according to the following requirements and utilities Sections specifying piping systems.
   B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
   C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
   D. Install piping to permit valve servicing.
   E. Install piping at indicated slopes.
   F. Install piping free of sags and bends.
   G. Install fittings for changes in direction and branch connections.
   H. Select system components with pressure rating equal to or greater than system operating pressure.
   I. Sleeves are not required for core-drilled holes.
J. Permanent sleeves are not required for holes formed by removable PE sleeves.

K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
   1. Cut sleeves to length for mounting flush with both surfaces.
   2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
      a. PVC Pipe Sleeves: For pipes smaller than NPS 6.

3.4 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs for non-gasketed pipe. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.


F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer’s written instructions.

H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA’s “Copper Tube Handbook,” using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.


J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer’s written instructions.

K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
   3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
   4. PVC Nonpressure Piping: Join according to ASTM D 2855.
L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
N. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer’s written instructions.

3.5 PIPING CONNECTIONS
A. Make connections according to the following, unless otherwise indicated:
   1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
   3. Install dielectric fittings at connections of dissimilar metal pipes.

3.6 EQUIPMENT INSTALLATION
A. Install equipment level and plumb, unless otherwise indicated.
B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
C. Install equipment to allow right of way to piping systems installed at required slope.
D. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.
E. Field Welding: Comply with AWS D1.1/D1.1M.

3.7 INSTALLATION NEAR UNDERGROUND STEAM TRANSMISSION PIPE
A. Utility should be installed 3 feet horizontally offset from steam transmission pipe, unless otherwise indicated, to provide adequate insulation from potentially damaging heat dissipating in area.
   1. If plans indicate utility to be placed closer than 3 feet horizontally, they should not, under any circumstances, be installed within space designated for Gilsulate 500XR insulation.
B. When utility crosses steam transmission piping, adhere to the following guidelines:
   1. Gilsulate 500XR insulation shall not be disturbed.
   2. Schedule 80, 12 inch diameter metal pipe shall be cut in half, cross-sectionally, and installed along steam transmission and pumped discharge piping to protect crossing utility from potentially damaging heat.
      a. For utility crossing over top of steam transmission pipe, install metal pipe concave downward, and allow spacing for adequate bedding between utility and metal pipe.
      b. For utility crossing beneath steam transmission pipe, install metal pipe concave upward, and allow spacing for adequate bedding between Gilsulate 500XR and metal pipe.
      c. Center the metal pipes over intersection point of utility and steam transmission piping and the intersection point of utility and pumped discharge piping.
   3. Detail included in BID PACKAGE #2.
3.8 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 330500
SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
   1. Special fittings for expansion and deflection.
   2. Stormwater inlets.
   3. Pipe and fittings.
   5. Drains.
   6. Stormwater inlets

1.3 DEFINITIONS

B. EPDM: Ethylene-propylene-diene-monomer rubber.
C. HDPE: High density polyethylene pipe
D. FRP: Fiberglass-reinforced plastic.
E. PVC: Polyvinyl chloride plastic.
F. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silt-tight, unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Special pipe fittings.

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2. Drains.

B. Shop Drawings: For the following:
   1. Yard Inlets, Catch basins, pavement drains, and Trench Drains. Include plans, elevations, sections, details, and frames, covers, and grates.

C. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic drainage structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle stormwater inlets according to manufacturer's written rigging instructions.

1.7 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 Architect no fewer than two days in advance of proposed interruption of service.
   2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 HDPE PIPE AND FITTINGS

A. Corrugated HDPE Drainage Pipe and Fittings NPS 10 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
1. Available Manufacturers:
   a. ADS (Advanced Drainage Systems) or equivalent.

2. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.


5. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.


B. Corrugated HDPE Pipe and Fittings NPS 56 and NPS 60: AASHTO MP7, Type S, with smooth waterway for coupling joints.

1. Available Manufacturers:
   a. ADS (Advanced Drainage Systems)

2. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.


2.4 PVC PIPE AND FITTINGS

A. PVC Pressure Pipe: AWWA C900, Class 150, for gasketed joints and using ASTM F 477, elastomeric seals.

   1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.

   2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.

B. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 40 pipe, with plain ends for solvent-cemented joints with ASTM D 2466, Schedule 40, socket-type fittings.


D. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T-1 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

E. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.
2.5 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:
   1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
   2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Shielded, Flexible Couplings:
   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. Cascade Waterworks Mfg.
      c. Mission Rubber Company; a division of MCP Industries, Inc.
   2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.6 STORMWATER INLETS

A. Catch Basin: Precast or cast-in-place basin and heavy duty grate and frame, size as indicated.

B. Yard Inlet: Nyloplast “Drain Basin”, size as indicated with heavy duty cast iron grate and frame or approved similar product.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

1. Use pressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
   a. Shielded flexible or rigid couplings for same or minor difference OD pipes.
b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.

c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

2. Use pressure-type pipe couplings all joints.

B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

C. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:

1. NPS 2: PVC Schedule 40, water-service pipe; PVC Schedule 40, water-service-pipe fittings; and solvent-cemented joints.
2. NPS 3: PVC Schedule 40, water-service pipe; PVC Schedule 40, water-service-pipe fittings; and solvent-cemented joints.
3. NPS 4: PVC pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.
4. NPS 6 to NPS 8: PVC pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.
5. NPS 10 to NPS 24: PVC pressure pipe; compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope as indicated on drawings.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
3. Install piping with 12-inch minimum cover.
4. Install HDPE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
5. Install PVC cellular-core piping according to ASTM D 2321 and ASTM F 1668.
6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
7. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

3.4 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:
   1. Join corrugated PE piping according to CPPA 100 and the following:
      a. Use silttight couplings for Type 2, silttight joints.
   2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
   3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
   4. Join dissimilar pipe materials with pressure-type flexible or rigid couplings.

C. Join dissimilar pipe materials with pressure-type couplings.

3.5 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.6 DRAIN INSTALLATION

A. Install type of drains in locations indicated.
   1. Use Heavy-Duty, top-loading classification drains in all areas.

B. Embed drains in 4-inch minimum concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

E. Assemble trench sections with flanged joints.
F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.7 STORM WATER INLET AND OUTLET INSTALLATION

A. Construct inlets, as indicated.

B. Set frames and grates to elevations indicated.

C. Place turf reinforcement mat as indicated.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.9 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Storm Drainage Piping Specialties."

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

   a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

   b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

B. Connect to sediment interceptors specified in Division 22 Section "Sanitary Waste Interceptors."
3.10 INSTALLATION NEAR UNDERGROUND STEAM TRANSMISSION PIPE

A. Utility should be installed 3 feet horizontally offset from steam transmission pipe, unless otherwise indicated, to provide adequate insulation from potentially damaging heat dissipating in area.

1. If plans indicate utility to be placed closer than 3 feet horizontally, they should not, under any circumstances, be installed within space designated for Gilsulate 500XR insulation.

B. When utility crosses steam transmission piping, adhere to the following guidelines:

1. Gilsulate 500XR insulation shall not be disturbed.
2. Schedule 80, 12 inch diameter metal pipe shall be cut in half, cross-sectionally, and installed along steam transmission and pumped discharge piping to protect crossing utility from potentially damaging heat.
   a. For utility crossing over top of steam transmission pipe, install metal pipe concave downward, and allow spacing for adequate bedding between utility and metal pipe.
   b. For utility crossing beneath steam transmission pipe, install metal pipe concave upward, and allow spacing for adequate bedding between Gilsulate 500XR and metal pipe.
   c. Center the metal pipes over intersection point of utility and steam transmission piping and the intersection point of utility and pumped discharge piping.

3.11 IDENTIFICATION

A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

   a. Alignment: Less than full diameter of inside of pipe is visible between structures.
   b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
   c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
   d. Infiltration: Water leakage into piping.
   e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Do not enclose, cover, or put into service before inspection and approval.
   2. Test completed piping systems according to requirements of authorities having jurisdiction.
   3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
   4. Submit separate report for each test.
   5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
      a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
      b. Option: Test plastic piping according to ASTM F 1417.
      c. Option: Test concrete piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.13 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 334100
SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes subdrainage systems for the following:
      1. Foundations.

1.3 DEFINITIONS
   B. HDPE: High-density polyethylene plastic.
   C. PE: Polyethylene plastic.
   D. PP: Polypropylene plastic.
   E. CPT: Corrugated polyethylene tubing
   F. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

1.4 SUBMITTALS
   A. Product Data: For the following:
      1. Perforated-wall pipe and fittings.
      2. Solid-wall pipe and fittings.
      3. French drain stone material

   B. Approval of waterproofing manufacturer’s service agent for use of drainage panels against and for waterproofing membrane protection.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
      1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS
   A. Refer to the “Piping Applications” Article in Part 3 for applications of pipe, tube, fitting, and joining materials.
2.3 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings:
   1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
   2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
   3. Couplings: Manufacturer’s standard, band type.

B. Perforated PVC Pipe and Fittings
   1. NPS 8 or smaller: ASTM D 2729 Sewer pipe and ASTM 1784

2.4 SOLID-WALL PIPES AND FITTINGS

A. ABS Sewer Pipe and Fittings: ASTM D 2751.

B. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.

C. PE Pipe and Fittings: AASHTO M 294, Type S, corrugated, with smooth waterway, for coupled joints.

2.5 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.
   1. Sleeve Materials:
      a. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      b. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

   2. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant metal tension band and tightening mechanism on each end.

   3. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

2.6 DRAINAGE CONDUITS

A. Single-Pipe Drainage Conduits: Prefabricated geocomposite with perforated corrugated core molded from HDPE complying with ASTM D 3350 and wrapped in geotextile filter fabric.
   1. Available Manufacturers:
      b. Or approved equal

   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. Nominal Size: 18 inches high by approximately 1 inch thick.
   a. Minimum In-Plane Flow: 45 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.

5. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.

2.7 SOIL MATERIALS
   A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section “Earth Moving.”

2.8 GEOTEXTILE FILTER FABRICS
   A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
      1. Structure Type: woven, monofilament or multifilament.
      2. Style(s): Flat and Sock.

2.9 STRIP DRAIN AND FITTINGS
   A. Prefabricated drain with a high-profile, perforated, three-dimensional core fully wrapped with non-woven filter fabric, securely bonded to prevent soil intrusion into the core flow channel while allowing water to freely enter the drainage channel. Basis of Design: subject to requirements, provide American Wick Drain SITEDRAIN Strip 6400 strip drain or equivalent product meeting the following minimum specifications:
      1. Non-Woven filter fabric:
         a. Water Flow Rate ASTM D4491 150 gpm /sf
         b. Grab Tensile Strength ASTM D4632 130 lbs
         c. CBR Puncture Resistance ASTM D6241 360 lbs
         d. Apparent Opening Size ASTM D4751 70 sieve
         e. Permittivity ASTM D 4491 2.2 / sec
         f. UV Resistance ASTM D 4355 70% surviving 500 hours.
         g. AASHTO M288-06 Survivability Class 3.
      2. Polystyrene core
         a. Material - HI polystyrene
         b. Thickness ASMT D1777 1.0 inches
         c. Compressive Strength ASTM D1621 6,000 psf
         d. Flow Rate ASTM D4716 21 gpm/ft

B. STRIP DRAIN FITTINGS & COUPLINGS
   C. Provide manufacturer’s standard fittings and couplings for strip drain.
      1. Install per manufacturer’s written requirements for similar site conditions.
2.10 STRIP DRAIN OUTLET
   A. Provide manufacturer’s standard universal T-outlet for strip drain to transition to 6” solid HDPE pipe.
      1. Install per manufacturer’s written requirements for similar site conditions.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
   B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK
   A. Excavating, trenching, and backfilling are specified in Division 31 Section “Earth Moving.”

3.3 PIPING APPLICATIONS
   A. Underground Subdrainage Piping:
      1. Perforated PE pipe and fittings, couplings, and coupled joints.
      2. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.
      3. Strip drain

3.4 FOUNDATION DRAINAGE INSTALLATION
   A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
   B. Place impervious fill on subgrade adjacent to bottom of footing and compact to dimensions indicated, but not less than 6 inches deep and 12 inches wide after concrete footing forms have been removed.
   C. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
   D. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
   F. Install drainage piping as indicated in Part 3 “Piping Installation” Article for foundation subdrainage.
   G. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
H. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

I. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

J. Place layer of flat style over top of drainage course, overlapping edges at least 4 inches.

K. Install vertical drainage panels as follows:
   1. Coordinate placement with other drainage materials.
   2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 “Piping Installation” Article. Do not install aggregate.
   4. Wrap bottom of panel around drainage pipe.
   5. If additional panels are required on same row, cut away 4 inches of installed panel core, install new panel against installed panel, and overlap new panel with installed panel fabric.
   6. If additional rows of panels are required, overlap lower panel with 4 inches of fabric.
   7. Cut panel as necessary to keep top 12 inches below finish grade.
   8. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.

L. Do not use drainage panels as protection for waterproof membrane unless approved by factory-authorized service representative of waterproofing membrane manufacturer. Submit approval if so used.

M. Place initial backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.5 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. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 24” unless otherwise indicated.
   2. Lay perforated pipe with perforations down.
   3. 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 ABS piping according to ASTM D 2321.

D. Install PE piping according to ASTM D 2321.

E. Install PVC piping according to ASTM D 2321.

F. Install strip drain per manufacturer’s written recommendations.
3.6 PIPE JOINT CONSTRUCTION
   A. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO’s “Standard Specifications for Highway Bridges,” Division II, Section 26.4.2.4, “Joint Properties.”
   B. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO’s “Standard Specifications for Highway Bridges,” Division II, Section 26.4.2.4, “Joint Properties”; or according to ASTM D 2321.
   C. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.
   D. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.
   E. 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.

3.7 CONNECTIONS
   A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.8 FIELD QUALITY CONTROL
   A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.9 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 334600
Bid Number: EKU 140-20

Project: Outdoor Volleyball Complex

Project Drawings
EKU ATHLETICS - NCAA SAND VOLLEYBALL COMPLEX
Eastern Kentucky University
Richmond, KY

Commonwealth of Kentucky, Andy Beshear, Governor
Eastern Kentucky University, David T. McFaddin, Interim President

EASTERN KENTUCKY UNIVERSITY
521 LANCASTER AVE.
RICHMOND, KENTUCKY 40475
(859) 622-1000
RCF #2196

SCHEDULE OF DRAWINGS:

- COVER SHEET: CVR
- SITE SURVEY: E0.0
- DEMOLITION PLAN: L1.0
- LAYOUT PLAN: L2.0
- MATERIALS PLAN: L3.0
- GRADING PLAN: L4.0
- DRAINAGE AND UTILITIES PLAN: L4.1
- SITE DETAILS: L5.0
- SITE DETAILS: L5.1
- SITE DETAILS: L5.2
- FENCE DETAILS: L5.3
- ELECTRICAL LEGEND: E0.0
- ELECTRICAL PLAN: E1.0
- ELECTRICAL DETAILS: E2.0

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KENTUCKY LAW REQUIRES THAT ANYONE PLANNING EXCAVATION OR DEMOLITION WORK TO CALL ALL UTILITY COMPANIES IN THE AREA AND/OR AN UNDERGROUND PROTECTION SERVICE SUCH AS "BUD" (1-800-752-6007) NOT LESS THAN TWO BUSINESS DAYS NOR MORE THAN TEN BUSINESS DAYS PRIOR TO COMMENCING WORK.

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www.element-site.com
6' TALL STEEL PICKET FENCE TYPICAL DETAIL

NOTES:
1. CONTRACTOR TO PROVIDE SHOP DRAWINGS.
2. INSTALL ALL HARDWARE PER MANUFACTURER REQUIREMENTS.
3. PROVIDE THIRD RAIL OPTION AS SHOWN.
4. REFER TO MANUFACTURER THROUGH OPENING TABLES FOR TRUE DIMENSIONS.

BASIS OF DESIGN:
AMERISTAR COMMERCIAL ORNAMENTAL STEEL FENCE: "MONTAGE - MAJESTIC 3-RAIL" (OR APPROVED EQUAL)
CONTRACTOR TO PROVIDE SHOP DRAWINGS
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www.ameristarfence.com

4' WIDE SWING GATE DETAIL - 6' TALL STEEL PICKET FENCE SYSTEM

BASIS OF DESIGN:
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12' WIDE DOUBLE SWING GATE DETAIL - 6' TALL STEEL PICKET FENCE SYSTEM

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