PROJECT MANUAL FOR: **Walton Stadium Track and Soccer Surface Upgrade**

PROJECT NUMBER: **CP251272**

AT
UNIVERSITY OF MISSOURI–COLUMBIA
COLUMBIA, MISSOURI

FOR:

THE CURATORS OF THE UNIVERSITY OF MISSOURI

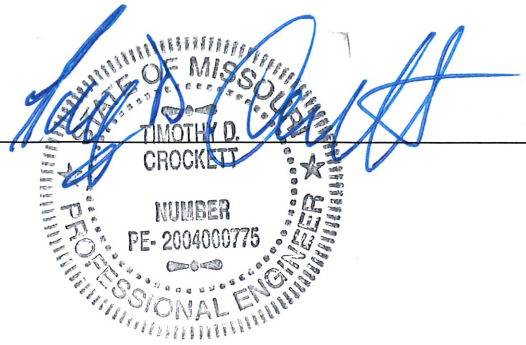
PREPARED BY:
Crockett Engineering Consultants, LLC
Tim Crockett
1000 W. Nifong Blvd., Bldg. 1
Columbia, MO 65203
573-447-0292
tim@crockettengineering.com

DATE: **September 8, 2025**

Civil

I hereby certify that these Drawings and/or Specifications have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.

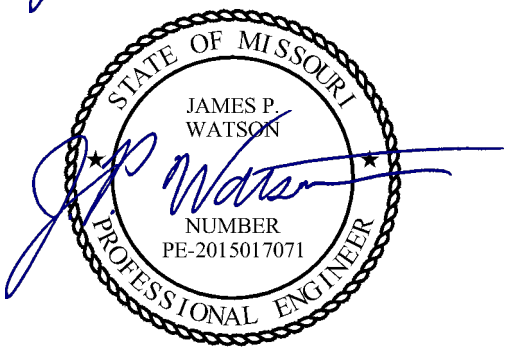
Signature: _____



Electrical

I hereby certify that these Drawings and/or Specifications have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.

Signature: _____



Structural

I hereby certify that these Drawings and/or Specifications have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.

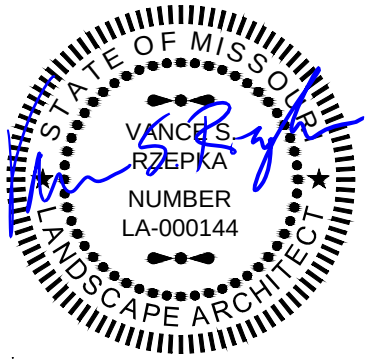
Signature: _____

GREGORY L. LINNEMAN - PE
MO LICENSE - 2005001013

Landscape Architect

I hereby certify that these Drawings and/or Specifications have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and/or Specifications are as required by and in compliance with Building Codes of the University of Missouri.

Signature: _____



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PLANNING DESIGN & CONSTRUCTION

900 E. Stadium, Ste. 130
Columbia, Missouri 65211
Telephone: (573) 882-6800

ADVERTISEMENT FOR BIDS

Sealed bids for:

WALTON STADIUM –
TRACK & SOCCER SURFACE UPGRADE
UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
PROJECT NUMBER: CP252172 CONSTRUCTION ESTIMATE: $4,626,000 - $5,140,000

will be received by the Curators of the University of Missouri, Owner, at Planning, Design & Construction, Room L100 (Front Reception Desk), General Services Building, University of Missouri, Columbia, Missouri 65211, until 1:30 p.m., C.S.T., September 24, 2025 and then immediately opened and publicly read aloud.

Drawings, specifications, and other related contract information may be obtained at http://operations-webapps.missouri.edu/pdc/adsite/ad.html. Electronic bid sets are available at no cost and may be printed as desired by the plan holders. No paper copies will be issued. If paper copies are desired, it is the responsibility of the user to print the files or have them printed.

Questions regarding the scope of work should be directed to Tim Crockett with Crockett Engineering Consultants, LLC at (573) 447-0292 or tim@crockettengineering.com. Questions regarding commercial conditions should be directed to Heather Brown at (573) 884-6322 or brownheat@missouri.edu.

A prebid meeting will be held at 1:30 p.m., C.S.T., September 17, 2025 in the General Services Bldg., Room 194B, followed by a site walk-through.

This project has participations goals for Minority Business Enterprises (MBE), Women Business Enterprises (WBE) and Service-Disabled Veteran Business Enterprises (SDVE) as follows: 10% MBE, 10% WBE and 3% SDVE. Please see the Information for Bidders and General Conditions for additional information about the MBE/WBE/SDVE Participation Goals.

The Owner reserves the right to waive informalities in bids and to reject any and all bids.

Individuals with special needs as addressed by the Americans with Disabilities Act may contact (573) 882-6800.

Advertisement Date: September 10, 2025

SECTION 1.A

BID FOR LUMP SUM CONTRACT

Date:_____

BID OF _____
(hereinafter called "Bidder") a corporation* organized and existing under laws of the State of _____,
a partnership* consisting of _____,
an individual* trading as _____,
_____
a joint venture* consisting of _____.
*Insert Corporation(s), partnership or individual, as applicable.

TO: Curators of the University of Missouri
c/o Associate Vice Chancellor – Facilities
Room L100, General Services Building
University of Missouri
Columbia, Missouri 65211

1. Bidder, in compliance with invitation for bids for construction work in accordance with Drawings and Specifications prepared by Crockett Engineering Consultants, entitled Walton Stadium Track and Soccer Stadium Upgrade, project number CP252172, dated September 8, 2025 having examined Contract Documents and site of proposed work, and being familiar with all conditions pertaining to construction of proposed project, including availability of materials and labor, hereby proposes to furnish all labor, materials and supplies to construct project in accordance with Contract Documents, within time set forth herein at prices stated below. Prices shall cover all expenses, including taxes not covered by the University of Missouri's tax exemption status, incurred in performing work required under Contract documents, of which this Bid is a part.

   Bidder acknowledges receipt of following addenda:

   Addendum No. _____ Dated _____
   Addendum No. _____ Dated _____
   Addendum No. _____ Dated _____

2. In the following Bid(s), amount (s) shall be written in both words and figures. In case of discrepancy between words and figures, words shall govern.

3. BID PRICING

a. Base Bid:
The Bidder agrees to furnish all labor, materials, tools, and equipment required to install and perform this project; all as indicated on the Drawings and described in these Specifications for sum of:

_____

DOLLARS ($_____).

b. Additive Alternate Bids:

Above Base Bid may be changed in accordance with following Alternate Bids as Owner may elect. Alternates are as described in Section 1.H of Project Manual. Alternates are written in a priority order, but Owner is not required to accept or reject in order listed. This is a one (1) contract project, therefore, Alternates shall be studied by each Bidder to determine effect on Bids of Contractor and each Subcontractor and/or Material supplier.

(1) Additive Alternate No. 1:
Additive Alternate No. 1 shall consist of the removal and replacement of existing Soccer Practice field including all underdrain and irrigations systems. All for sum of:

_____

DOLLARS ($_____).

(2) Additive Alternate No. 2:
Additive Alternate No. 2 shall consist of the Sand Pit. All for sum of:

_____

_____DOLLARS ($_____).

c. Unit Prices:

(1) For changing specified quantities of work from those indicated by Contract Drawings and Specifications, upon written instructions of Owner, the following Unit Prices shall prevail in accordance with General Conditions.

(2) The following Unit Prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover all work.

(3) The following Unit Prices are required where applicable to particular Base Bid and/or Alternate being submitted.

(4) Only a single Unit Price shall be given and it shall apply for either MORE or LESS work than that indicated on Drawings and called for in

Specifications as indicated to be included in Base Bid and/or Alternates. In the event that more or less units than so indicated is actually furnished, Change Orders will be issued for increased or decreased amounts as approved by the Owner.

(5) Bidder understands that the Owner will not be liable for any Unit Price or any amount in excess of Base Bid and any Alternate(s) accepted at time of award of Contract, except as expressed in written Change Orders duly executed and delivered by Owner's Representative.

(6) Unsuitable material. Price shall include all cost to export unsuitable material, haul in suitable material, and provide appropriate compaction and moisture conditioning of replacement material as outlined in Section 31 2000 "Earthmoving"

(a) Unsuitable Material,
Base Bid quantity = 1000 cu. yd. $_____/cu. yd.

(7) Rock Excavation in addition to soil excavation, as defined in Division 2, per cu. yd.

(a) General Excavation,
Base Bid quantity = 50 cu. yd. $_____/cu. yd.

(b) Trenching,
Base Bid quantity = 50 cu. yd. $_____/cu. yd.

4. PROJECT COMPLETION to start Nov. 3rd, 2025, Track completed by August 14th, 2026, Soccer June 26th, 2026

a. Contract Period - Contract period begins on the day the Contractor receives unsigned Contract, Performance Bond, Payment Bond, and "Instructions for Execution of Contract, Bonds, and Insurance Certificates." Bidder agrees to complete project within two hundred ten (210) calendar days from receipt of aforementioned documents. Fifteen (15) calendar days have been allocated in construction schedule for receiving aforementioned documents from Bidder.

b. Commencement - Contractor agrees to commence work on this project after the "Notice to Proceed" is issued by the Owner. "Notice to Proceed" will be issued within seven (7) calendar days after Owner receives properly prepared and executed Contract documents listed in paragraph 4.a. above.

5. SUBCONTRACTOR LIST:

Bidder hereby certifies that the following subcontractors will be used in performance of Work:

NOTE: Failure to list subcontractors for each category of work identified on this form or listing more than one subcontractor for any category of work without designating the portion of work performed by each shall be grounds for rejection of bid. List name, city, and state of designated subcontractor, for each category of work listed in Bid For Lump Sum Contract. If work within a category will be performed by more than one subcontractor, Bidder shall provide name, city, and state of each subcontractor and specify exact portion of work to be performed by each. If acceptance/non-acceptance of Alternates will affect designation of a subcontractor, Bidder shall provide information, for each affected category, with this bid form. If Bidder intends to perform any designated subcontract work by using Bidder's own employees, then Bidder shall list their own name, city, and state. The bidder may petition the Owner to change a listed subcontractor only within 48 hours of the bid opening. See Information For Bidders Section 16 List of Subcontractors for requirements.

Work to be performed	Subcontractor Name, City, State
Track	
Earthwork	
Soccer Turf	

6. MBE/WBE/SDVE PARTICIPATION

a. SDVE Bonus Preference: A three (3) point bonus preference will be given to a Bidder that is a certified Service-Disabled Veteran Business Enterprise (SDVE) doing business as Missouri firm, corporation, or individual, or that maintains a Missouri office or place of business, as stated in the Information for Bidders. By indicating "Yes" below, the Bidder certifies that the Bidder is certified as an SDVE by the State of Missouri, Office of Administration.

Yes_____ No _____

b. MBE/WBE/SDVE Participation Goals: The Bidder shall have a goal of providing participation in the contract of Minority Business Enterprises (MBE) of ten percent (10%) with Women Business Enterprises (WBE) of ten percent (10%), and with Service-Disabled Veteran Business Enterprises (SDVE) of three percent (3%) of the awarded contract price for work to be performed.

c. Good Faith Effort Waiver: Requests for waiver of these goals due to good faith effort shall be submitted on the attached Application For Waiver form. A determination by the UM Executive Director of Facilities Planning and

Development that a good faith effort has not been made by Bidder to achieve above stated goals may result in rejection of the bid.

d. The undersigned Bidder proposes to perform work with the MBE/WBE/SDVE participation level set forth below. An MBE/WBE/SDVE Compliance Evaluation form shall be submitted with this bid for each MBE/WBE/SDVE subcontractor to be used on this project.

MBE PERCENTAGE PARTICIPATION: _____ percent (_____%)
WBE PERCENTAGE PARTICIPATION: _____ percent (_____%)
SDVE PERCENTAGE PARTICIPATION: _____ percent (_____%)

7. BIDDER'S ACKNOWLEDGMENTS

a. Bidder declares that he has had an opportunity to examine the site of the work and he has examined Contract Documents therefore; that he has carefully prepared his bid upon the basis thereof; that he has carefully examined and checked bid, materials, equipment and labor required thereunder, cost thereof, and his figures therefore. Bidder hereby states that amount, or amounts, set forth in bid is, or are, correct and that no mistake or error has occurred in bid or in Bidder's computations upon which this bid is based. Bidder agrees that he will make no claim for reformation, modifications, revisions or correction of bid after scheduled closing time for receipt of bids.

b. Bidder agrees that bid shall not be withdrawn for a period of 90 days after scheduled closing time for receipt of bids.

c. Bidder understands that Owner reserves right to reject any or all bids and to waive any informalities in bidding.

d. Accompanying the bid is a bid bond, or a certified check, or an irrevocable letter of credit, or a cashier's check payable without condition to "The Curators of the University of Missouri" which is an amount at least equal to five percent (5%) of amount of largest possible total bid herein submitted, including consideration of Alternates.

e. Accompanying the bid is a Bidder's Statement of Qualifications. Failure of Bidder to submit the Bidder's Statement of Qualifications with the bid may cause the bid to be rejected. Owner does not maintain Bidder's Statements of Qualifications on file.

f. It is understood and agreed that bid security of two (2) lowest and responsive Bidders will be retained until Contract has been executed and an acceptable Performance Bond and Payment Bond has been furnished. It is understood and agreed that if the bid is accepted and the undersigned fails to execute the

Contract and furnish acceptable Performance/Payment Bond as required by Contract Documents, accompanying bid security will be realized upon or retained by Owner. Otherwise, the bid security will be returned to the undersigned.

8. BIDDER'S CERTIFICATE

Bidder hereby certifies:

a. His bid is genuine and is not made in interest of or on behalf of any undisclosed person, firm or corporation, and is not submitted in conformity with any agreement or rules of any group, association or corporation.

b. He has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.

c. He has not solicited or induced any person, firm or corporation to refrain from bidding.

d. He has not sought by collusion or otherwise to obtain for himself any advantage over any other Bidder or over Owner.

e. He will not discriminate against any employee or applicant for employment because of race, color, religion, or national origin in connection with performance of work.

f. By virtue of policy of the Board of Curators, and by virtue of statutory authority, a preference will be given to materials, products, supplies, provisions and all other articles produced, manufactured, mined or grown within the State of Missouri. By virtue of policy of the Board of Curators, preference will also be given to all Missouri firms, corporations, or individuals, all as more fully set forth in "Information For Bidders."

9. BIDDER'S SIGNATURE

Note: All signatures shall be original; not copies, photocopies, stamped, etc.

Authorized Signature	Date
Printed Name	Title
Company Name	

Mailing Address	
City, State, Zip	
Phone No.	Federal Employer ID No.
Fax No.	E-Mail Address
Circle one: Individual Partnership Corporation Joint Venture	
If a corporation, incorporated under the laws of the State of__	
Licensed to do business in the State of Missouri? __yes ___no	

(Each Bidder shall complete bid form by manually signing on the proper signature line above and supplying required information called for in connection with the signature. Information is necessary for proper preparation of the Contract, Performance Bond and Payment Bond. Each Bidder shall supply information called for in accompanying "Bidder's Statement of Qualifications.")

END OF SECTION

UNIVERSITY OF MISSOURI
BIDDER'S STATEMENT OF QUALIFICATIONS

Submit with Bid for Lump Sum Contract in separate envelope appropriately labeled. Attach additional sheet if necessary.

1. Company Name_____

   Phone# _____ Fax #:_____

   Address _____

2. Number of years in business _____. If not under present firm name, list previous firm names and types of organization.

   _____

   _____

3. List contracts on hand (complete the following schedule, include telephone number).

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

4. General character of work performed by your company personnel.

   _____

5. List important projects completed in the last five (5) years on a type similar to the work now bid for, including approximate cost and telephone number.

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

6. Other experience qualifying you for the work now bid.

   _____

   _____

7. No default has been made in any contract complete or incomplete except as noted below:
   (a) Number of contracts on which default was made _____
   (b) Description of defaulted contracts and reason therefor

   _____

   _____

8. Are you or your company certified by the State of Missouri, Office of Administration as a Minority Business Enterprise (MBE), Women Business Enterprise (WBE), or Service-Disabled Veteran Business Enterprise (SDVE)?

   Yes _____ No _____

9. Have you or your company been suspended or debarred from working at any University of Missouri campus?
Yes _____ No ____ (If the answer is "yes", give details.)

_____

_____

10. Have any administrative or legal proceedings been started against you or your company alleging violation of any wage and hour regulations or laws?
Yes _____ No ____ (If the answer is "yes", give details.)

_____

_____

11. Workers Compensation Experience Modification Rates (last 3 yrs): _____/_____/_____

Incidence Rates (last 3 years): _____/____/_____

12. List banking references.

_____

_____

13. (a) Do you have a current confidential financial statement on file with Owner?
Yes _____ No ____ (If not, and if desired, Bidder may submit such statement with bid, in a separate sealed and labeled envelope.)
(b) If not, upon request will you file a detailed confidential financial statement within three (3) days?
Yes _____ No ____

Dated at _____ this _____ day of _____ 20____

_____
Name of Organization

_____
Signature

_____
Printed Name

_____
Title of Person Signing

END OF SECTION

UNIVERSITY OF MISSOURI
BIDDER'S STATEMENT OF QUALIFICATIONS
FOR ASBESTOS ABATEMENT

Submit with Bid for Lump Sum Contract in separate envelope appropriately labeled. Attach additional sheet if necessary.

1. Company Name_____ Phone# _____

   Address _____

2. State of Missouri Registration number_____

3. Number of years in business If not under present firm name, list previous firm names and types of organization.

   _____

   _____

4. List contracts on hand (complete the following schedule, include telephone number).

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

5. General character of work performed by your company personnel.

   _____

6. List important projects completed in the last five (5) years on a type similar to the work now bid for, including approximate cost and telephone number.

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

7. Other experience qualifying you for the work now bid.

   _____

   _____

8. No default has been made in any contract complete or incomplete except as noted below:
   (a) Number of contracts on which default was made _____
   (b) Description of defaulted contracts and reason therefor

   _____

   _____

9. Are you or your company certified by the State of Missouri, Office of Administration as a Minority Business Enterprise (MBE), Women Business Enterprise (WBE), or Service-Disabled Veteran Business Enterprise (SDVE)?

Yes _____ No ____

10. Have you or your company been suspended or debarred from working at any University of Missouri campus?
Yes _____ No ____ (If the answer is "yes", give details.)

_____

_____

11. Have any administrative or legal proceedings been started against you or your company alleging violation of any wage and hour regulations or laws?
Yes _____ No ____ (If the answer is "yes", give details.)

_____

_____

12. Workers Compensation Experience Modification Rates (last 3 yrs): _____/_____/_____

Incidence Rates (last 3 years): _____/____/_____

13. List banking references.

_____

_____

14. (a) Do you have a current confidential financial statement on file with Owner?
Yes _____ No _____ (If not, and if desired, Bidder may submit such statement with bid, in a separate sealed and labeled envelope.)

(b) If not, upon request will you file a detailed confidential financial statement within three (3) days?
Yes _____ No _____

Dated at _____ this _____ day of _____ 20____

_____
Name of Organization

_____
Signature

_____
Printed Name

_____
Title of Person Signing

MBE/WBE/SDVE COMPLIANCE EVALUATION FORM

This form shall be completed by Bidders and submitted with the Bidder's Statement of Qualifications form for each MBE/WBE/SDVE firm that will perform work under the contract. The undersigned submits the following data with respect to this firm's assurance to meet the goal for MBE/WBE/SDVE Participation.

1. Project: _____

2. Name of General Contractor: _____

3. Name of MBE/WBE/SDVE Firm: _____

   Address: _____

   Phone No.: _____ Fax No.: _____

   Status (check one) MBE _____ WBE _____ Service-Disabled Veteran_____

4. Describe the work to be performed. (List Base Bid work and any Alternate work separately):

   Base Bid:

   _____

   _____

   _____

   _____

5. Dollar amount of contract to be subcontracted to the MBE/WBE/SDVE firm:

   Base Bid:

   Alternate(s), (Identify separately):

   _____

   _____

   _____

   _____

6. Is the proposed firm certified as an MBE/WBE/SDVE by the State of Missouri, Office of Administration?

   Yes _____ No _____

Signature: _____

Name: _____

Title: _____

Date: _____

APPLICATION FOR WAIVER

This form shall be completed and submitted with the Bidder's Statement of Qualifications. Firms wishing to be considered for award are required to demonstrate that a good faith effort has been made to meet the MBE/WBE/SDVE Participation Goals for that project. This form will be used to evaluate the extent to which a good faith effort has been made. The undersigned submits the following data with respect to the Bidder's efforts to meet the MBE/WBE/SDVE Participation Goals.

1. List pre-bid conferences your firm attended where MBE/WBE/SDVE Participation Goals were discussed.

2. Identify advertising efforts undertaken by your firm which were intended to recruit potential MBE/WBE/SDVE subcontractors or suppliers for various aspects of this project. Provide names of newspapers, dates of advertisements and copies of ads that were run.

3. Note specific efforts to contact in writing those MBE/WBE/SDVE firms capable of and likely to participate as subcontractors or suppliers for this project.

4. Describe steps taken by your firm to divide work into areas in which MBE/WBE/SDVE firms would be capable of performing.

5. What efforts were taken to negotiate with prospective MBE/WBE/SDVE? Include the names, addresses, and telephone numbers of MBE/WBE/SDVE firms contacted, a description of the information given to MBE/WBE/SDVE firms regarding plans and specifications for the assigned work, and a statement as to why additional agreements were not made with MBE/WBE/SDVE firms.

6. List reasons for rejecting an MBE/WBE/SDVE firm which has been contacted.

_____

_____

7. Describe the follow-up contacts with MBE/WBE/SDVE firms made by your firm after the initial solicitation.

_____

_____

_____

8. Describe the efforts made by your firm to provide interested MBE/WBE/SDVE firms with sufficiently detailed information about the plans, specifications and requirements of the contract.

_____

_____

_____

9. Describe your firm's efforts to locate MBE/WBE/SDVE firms.

_____

_____

_____

Based on the above stated good faith efforts made to meet the MBE/WBE/SDVE Participation Goals, the Bidder hereby requests that the original goal be waived and that the percentage goal for this project be set at _____ percent.

The undersigned hereby certifies, having read the answers contained in the foregoing Application for Waiver, that they are true and correct to the best of his/her knowledge, information and belief.

Signature: _____

Name: _____

Title: _____

Company: _____

Date: _____

AFFIDAVIT

"The undersigned swears that the foregoing statements are true and correct and include all material information necessary to identify and explain the operation of _____ (name of firm) as well as the ownership thereof. Further, the undersigned agrees to provide through the prime contractor or directly to the Contracting Officer current, complete and accurate information regarding actual work performed on the project, the payment therefore and any proposed changes, if any, of the project, the foregoing arrangements and to permit the audit and examination of books, records and files of the named firm. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under federal or state laws concerning false statements."

Note - If, after filing this information and before the work of this firm is completed on the contract covered by this regulation, there is any significant change in the information submitted, you must inform the UM Executive Director of Facilities Planning and Development of the change either through the prime contractor or directly.

Signature: _____

Name: _____

Title: _____

Date: _____

Corporate Seal (where appropriate)

Date: _____

State of _____

County of _____

On this _____ day of _____, 20__, before me appeared _____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by _____to execute the affidavit and did so as his or her own free act and deed.

(Seal)

_____
Notary Public

Commission expires: _____

University of Missouri
INFORMATION FOR BIDDERS

July 2024 Edition

1. Contract Documents and Definitions

1.1 The "Drawings," "Specifications," and "Contract Documents" are defined in the "General Conditions of the Contract for Construction."

1.2 The Drawings, Specifications, and other Contract Documents may be obtained as indicated in the Advertisement for Bids.

1.3 As used herein, "Bid" refers to an offer or proposal submitted to the Owner to enter into a contract for the work identified in the Drawings, Specifications and other Contract Documents.

1.4 As used herein, "Bidder" means an individual or business entity that submits a Bid to the Owner as a prime bidder or general contractor.

1.5 All other terms used herein shall have the meanings defined herein or in the General Conditions of the Contract for Construction or other Contract Documents.

2. Bidder Obligations

2.1 Before submitting a Bid, each Bidder shall carefully examine the Drawings and Specifications and related Contract Documents, visit the site of the work, and fully inform themselves as to all existing conditions, facilities, restrictions, and other matters that could affect the work or the cost thereof.

2.2 Each Bidder shall include in their Bid the cost of all work and materials required to complete the contract in a first-class manner, as specified in the Drawings, Specifications, and other Contract Documents. All work shall be done as defined in the Specifications and as indicated on the Drawings.

2.3 Failure or omission of any Bidder to receive or to examine any form, instrument, addendum, or other document, or to visit the site of the work and acquaint themselves with existing conditions, shall in no way relieve the Bidder from any obligation with respect to their Bid or any awarded contract. No extra compensation will be allowed concerning any matter about which the Bidder should have fully informed themselves prior to submitting a Bid.

2.4 Submission of a Bid shall be deemed acceptance by the Bidder of the above obligations and every obligation required by the Contract Documents in the event the Bid is accepted by the Owner.

3. Interpretation of Documents

3.1 If any prospective Bidder is in doubt about the meaning of any part of the Drawings, Specifications, or other Contract Documents, the Bidder shall submit a written request to the Architect for an interpretation.

3.2 Any request for interpretation shall be delivered to the Architect at least one (1) week prior to time for receipt of bids.

3.3 A Bid shall be based only on an interpretation issued in the form of an addendum mailed to each person or business entity that is on the Architect's record as having received a set of the Contract Documents.

3.4 Bidders shall not be entitled to rely on oral interpretations or written statements not issued in an addendum from either the Architect or a representative, agent, or employee of the Owner.

4. Bids

4.1 Bids shall be submitted on a single "Bid for Lump Sum Contract" form ("Bid Form") as furnished by the Owner or Architect. Bids shall be received separately or in combination as required by Bid Form

4.2 In addition to the Bid Form, the Bid shall include any documents or information required to be submitted by this Information for Bidders or the Contract Documents.

4.3 Bids shall include amounts for alternate bids, unit prices, and cost accounting data where required by the Bid Form.

4.4 Bidders shall apportion each base Bid between various phases of the work, where stipulated in the Bid Form.

4.5 Bids shall be presented in sealed envelopes, which shall be plainly marked "Bids for (indicate name of project from cover sheet)" and mailed or delivered to the building and room number specified in the Advertisement for Bids.

4.6 Each Bidder shall be responsible for actual delivery of their bid during business hours, and it shall not be sufficient to show that a Bid was mailed in time to be received before scheduled closing time for receipt of bids, nor shall it be sufficient to show that a Bid was somewhere in a university facility.

4.7 The Bidder's price shall include all federal sales, excise, and similar taxes that may be lawfully assessed in connection with their performance of work and purchase of materials to be incorporated in the work. City and State taxes shall not be included as stated in the General Conditions of the Contract for Construction.

4.8 No Bidder shall stipulate in their Bid any conditions not contained in the Bid Form or Contract Documents. Inclusion of any additional conditions or taking exception to any terms may result in rejection of the Bid.

4.9 The Owner reserves the right to waive informalities in bids and to reject any or all bids.

5. Modification and Withdrawal of Bids

5.1 A Bidder may withdraw their Bid at any time before the scheduled closing time for receipt of bids. No Bidder may withdraw their Bid after the scheduled closing time for receipt of bids.

5.2 Only a written request for modification or correction of a previously submitted Bid, contained in a sealed envelope that is plainly marked "Modification of Bid on (name of project on cover sheet)," which is addressed in the same manner as a Bid and received by Owner before the scheduled closing time for receipt of bids, will be accepted and the Bid modified in accordance with such written request.

6. Signing of Bids

6.1 All bids shall be signed manually, by an individual authorized to sign on behalf of the Bidder. The title or office held by the person signing for the Bidder shall appear below the signature.

6.2 A Bid should contain the full and correct legal name of the Bidder. If the Bidder is an entity registered with the Missouri Secretary of State, the Bidder's name on the Bid form should appear as shown in the Secretary of State's records.

6.3 A Bid from a partnership or joint venture shall be signed in the name of the partnership or joint venture by at least one partner or joint venturer or by an Attorney-in-Fact. If signed by Attorney-in-Fact there should be attached to the Bid, a Power of Attorney evidencing authority to sign the Bid executed by all partners or joint venturers.

6.4 A Bid from a corporation shall be signed by an officer of the corporation.

6.5 A Bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.

6.6 A Bid from an individual or sole proprietor shall be signed in the name of the individual by the individual or an Attorney-in-Fact. If signed by Attorney-in-Fact there should be attached to the Bid, a Power of Attorney evidencing authority to sign the Bid executed by the individual.

7. Bid Security

7.1 Each Bid shall be accompanied by a Bid Bond, certified check, or cashier's check, acceptable to and payable without condition to "The Curators of the University of Missouri" in an amount at least equal to five percent (5%) of the Bidder's Bid including additive alternates ("Bid Security").

7.2 Bid security is required as a guarantee that the Bidder will enter into a written contract and furnish a Performance Bond within the time and in form as specified herein or in the Contract Documents; and, if successful Bidder fails to do so, the Bid Security will be realized upon or retained by the Owner. The apparent low Bidder shall notify the Owner in writing within forty-eight (48) hours of the Bid opening of any circumstance that may affect the Bid Security including, but not limited to, an error in the Bid. This notification will not guarantee release of the Bidder's security and/or the Bidder from the Bidder's obligations.

7.3 If a Bid Bond is given as a Bid Security, the amount of the Bid Bond may be stated as an amount equal to at least five percent (5%) of the Bid, including additive alternates, described in the Bid. The Bid Bond shall be executed by the Bidder and a responsible surety licensed in the State of Missouri with a Best's rating of no less than A-/XI.

7.4 It is specifically understood that the Bid Security is a guarantee and shall not be considered as liquidated damages for failure of Bidder to execute and deliver the contract and Performance Bond, nor limit or fix the Bidder's liability to the Owner for any damages sustained because of failure to execute and deliver the required contract and Performance Bond.

7.5 The Bid Security of the two (2) lowest, responsive, responsible bidders will be retained by the Owner until a contract has been executed and an acceptable Performance Bond has been furnished, as required hereby, when such Bid Security will be returned. The Bid Bonds of all other Bidders will be destroyed and all other alternative forms of Bid Security will be returned to them within ten (10) days after the Owner has determined the two (2) lowest, responsive, responsible bids.

8. Bidder's Statement of Qualifications

8.1 Each Bidder shall present evidence of their experience, qualifications, financial responsibility, and ability to carry out the terms of the contract by completing and submitting with their Bid the "Bidder's Statement of Qualifications" form included with the Bid

documents.

8.2 Financial information required to be included with the Statement of Qualifications may be submitted by the Bidder in a separately sealed envelope, which will not be opened by the Owner during the public Bid opening.

8.3 The Bidder's Statement of Qualifications will be treated as confidential information by the Owner to the extent permitted by the Missouri Sunshine Law, Section 610.010, RSMo et seq.

8.4 Bids not accompanied by the Bidder's Statement of Qualifications may be rejected.

9. Award of Contract

9.1 The Owner reserves the right to let other contracts in connection with the work, including, but not limited to, contracts for furnishing and installation of furniture, equipment, machines, appliances, and other apparatus.

9.2 In awarding the contract, the Owner may take into consideration the ability of the Bidder, and their subcontractors, to handle promptly the additional work; the skill, facilities, capacity, experience, ability, responsibility, previous work, and financial standing of Bidder; the Bidder's ability to provide the required bonds and insurance; the quality, efficiency and construction of equipment proposed to be furnished; the period of time within which equipment is proposed to be furnished and delivered; success in achieving the specified Supplier Diversity Goals or demonstrating a good faith effort to do so as described in Article 15 of this document; and the Bidder's status as suspended or debarred. Inability of any Bidder to meet the requirements mentioned above may be cause for rejection of their Bid.

10. Contract Execution

10.1 The awarded Bidder shall submit within fifteen (15) days from receipt of notice of award, the documents required in Article 9 of the General Conditions of the Contract for Construction.

10.2 No bids will be considered binding upon the Owner until all such required documents have been furnished. Failure of Contractor to execute and submit such documents within the time specified will be treated, at the option of the Owner, as a breach of the Bidder's Bid Security and the Owner shall be under no further obligation to the Bidder.

11. Contract Security

11.1 When the Contract Sum exceeds $50,000, the Contractor shall procure and furnish a Performance Bond and a Payment Bond in the form prepared by the Owner. Each bond shall be in the amount equal to one hundred percent (100%) of the Contract Sum, as well as adjustments to the Contract Sum. The Performance Bond shall secure and guarantee the Contractor's faithful performance of the Contract, including but not limited to the Contractor's obligation to correct any defects after final payment has been made as required by the Contract Documents. The Payment Bond shall secure and guarantee payment of all persons performing labor on the Project under the Contract and furnishing materials in connection with the Contract in accordance with Section 107.170, RSMo. These bonds shall be in effect through the duration of the Contract plus any Guaranty Period required by the Contract Documents.

11.2 The bonds required hereunder shall be meet all requirements of Article 11 of the General Conditions of the Contract for Construction.

11.3 If the surety of any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to conduct business in the State of Missouri is terminated, or it ceases to meet the requirements of this Article 11, the Contractor shall within ten (10) days substitute another bond and surety, both of which must be acceptable to the Owner. If the Contractor fails to make such substitution, the Owner may procure such required bonds on behalf of Contractor at Contractor's expense.

12. Time of Completion

12.1 The awarded Contractor shall agree to commence work within five (5) days of the date "Notice to Proceed" is received from the Owner, and the entire work shall be completed by the completion date specified or within the number of consecutive calendar days stated in the Special Conditions. The duration of the construction period, when specified in consecutive calendar days, shall begin when the contractor receives notice requesting the documents required in Article 9 of the General Conditions of the Contract for Construction.

13. Number of Contract Documents

13.1 The Owner will furnish the Contractor a copy of the executed contract, Performance Bond, and Payment Bond.

13.2 The Owner will furnish the Contractor the number of copies of complete sets of Drawings and Specifications for the work, as well as clarification and change order Drawings pertaining to change orders required during construction as set forth in the Special Conditions.

14. Missouri Products and Missouri Firms

14.1 The Curators of the University of Missouri have adopted a policy which is binding upon all employees and departments of the University of Missouri, and which by contract, shall be binding upon independent contractors and subcontractors with the University of Missouri whereby all other things being equal, and when the same can be secured without additional cost over foreign products, or products of other states, a preference shall be granted in all construction, repair and purchase contracts, to all products, commodities, materials, supplies, and articles mined, grown, produced, and manufactured in marketable quantity and quality in the State of Missouri, and to all firms, corporations or individuals doing business as Missouri firms, corporations, or individuals. Each Bidder submitting a Bid agrees to comply with and be bound by the foregoing policy.

15. Supplier Diversity

15.1 Award of Contract

15.1.1 The Bidder shall have a minimum goal of providing participation of Diverse Firms in the project, through self-performance, if a Diverse Firm, or by subcontracting with Diverse Firms as subcontractors, suppliers, or manufacturers, in the amount of the percent of contract price stated in the Bid Form ("Supplier Diversity Goals"). The Owner will take into consideration the Bidder's success in achieving the Supplier Diversity Goals in awarding the contract. Inability of any Bidder to meet one or more of the Supplier Diversity Goals may be cause for rejection of their Bid, unless the Bidder has demonstrated that they made a good faith effort to comply as set forth below.

15.1.2 In addition to the Supplier Diversity Goals set forth in the Bid Form, a three (3) point bonus preference will be given to a Bidder that is a certified Service-Disabled Veteran Enterprises (SDVE) business doing business as Missouri firm, corporation, or individual, or that maintains a Missouri office or place of business. The bonus preference will **not** be given to a Bidder for the use of SDVE subcontractors, suppliers, or manufacturers. The bonus preference shall be calculated and applied by reducing the Bid amount of the SDVE Bidder by three (3) percent of the apparent low, responsive Bidder's Bid. Based on this calculation, if the SDVE Bidder's resulting total Bid valuation is less than the Bid of the apparent low, responsive Bidder, the SDVE Bid becomes the apparent low, responsive Bid. This reduction is for evaluation purposes only and will have no impact on the actual amount(s) of the SDVE Bidder's Bid or the amount(s) of any contract awarded.

15.2 List of Diverse Firms

15.2.1 The Bidder shall submit, within forty-eight (48) hours of the receipt of bids to the University Contracting Officer, a list of Diverse Firms that will be performing as contractor, subcontractor, supplier, or manufacturer on the project. The list shall separately identify each Diverse Firm by name and address. If acceptance or non-acceptance of alternates will affect the designation of a subcontractor, supplier, or manufacturer, the Bidder shall provide information for each affected category.

15.2.2 Failure to include a complete list of Diverse Firms that will be used to meet the Supplier Diversity Goals may be grounds for rejection of the Bid.

15.2.3 The list of Diverse Firms shall be submitted in addition to any other listing of subcontractors required in the Bid Form or elsewhere in this document.

15.3 Supplier Diversity Goal Computation

15.3.1 The Bidder may count toward the Supplier Diversity Goal only expenditures to Diverse Firms that perform a commercially useful function in the work of a contract. A Diverse Firm is considered to perform a commercially useful function when it is responsible for executing a distinct element of the work or contract and is carrying out its responsibilities by actually performing managing and supervising the work.

15.3.2 The Bidder may count toward its Supplier Diversity Goals work granted to a second or subsequent tier subcontractor that is a Diverse Firm provided the Diverse Firm assumes the actual and contractual responsibility for performing work on the project. The Bidder may count toward its Supplier Diversity Goals expenditures for materials and/or supplies obtained from a Diverse Firm, provided the Diverse Firm assumes the actual and contractual responsibility for the provision of the materials and/or supplies. To perform a commercially useful function, a supplier or manufacturer that is a Diverse Firm must be responsible for negotiating price, determining quality and quantity, ordering the material, installing (where applicable) and paying for the material itself.

15.3.3 A Diverse Firm does not perform a commercially useful function if its role is solely that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of participation. In determining whether a firm is such an extra participant, the Owner will examine similar transactions, particularly those in which Diverse Firms do not participate.

15.3.4 A Bidder that is a certified Diverse Firm may count one hundred percent 100% of the contract amount

towards the applicable Supplier Diversity Goal(s), less any amounts awarded to another Diverse Firm. For projects with separate Supplier Diversity Goals, the Bidder will be required to obtain participation in the other categories for which it is not certified through participation by subcontractors, suppliers, or manufacturers. Therefore, an MBE Bidder is expected to obtain the required SDVE and WBE/DBE/Veteran participation; a WBE/DBE/Veteran Bidder is expected to obtain the required MBE and SDVE participation; and a SDVE Bidder is expected to obtain the required MBE and WBE/DBE/Veteran participation.

15.3.5 If the Bidder is a joint venture and the joint venture itself is certified as a Diverse Firm, the joint venture may count toward the Supplier Diversity Goals that portion of the total dollar value of the work equal to the percentage of the ownership and control of the Diverse Firm participant in the joint venture. When a Diverse Firm performs work as a participant in a joint venture where the joint venture is **not** separately certified as a Diverse Firm, only the portion of the Contract Sum equal to the distinct, clearly defined portion of the work that the Diverse Firm performs with its own forces shall count toward the Supplier Diversity Goals.

15.3.6 If a Diverse Firm is certified in more than one Supplier Diversity category, that Diverse Firm may be used to satisfy more than one Supplier Diversity goal, provided that the Diverse Firm is awarded a sufficient percentage of the contract work to meet or exceed all applicable Supplier Diversity Goals.

15.4 Certification of Diverse Firms

15.4.1 The Bidder shall submit, within forty-eight (48) hours of the time for receipt of bids, to the University Contracting Officer, the information requested in the "Supplier Diversity Compliance Evaluation Form" for every Diverse Firm the Bidder intends to award work to under the contract to meet the Supplier Diversity Goals.

15.4.2 "Diverse Firm" is defined in Article 1 of the General Conditions of the Contract for Construction. The Bidder is responsible for obtaining information regarding the certification status of a Diverse Firm. A list of certified Diverse Firms may be obtained by contacting the agencies listed in the document entitled "Supplier Diversity Certifying Agencies."

15.4.3 Bidders are urged to encourage their prospective subcontractors, joint venture participants, team partners, suppliers and manufacturers who are Diverse Firms but are not currently certified to obtain certification from one of the approved agencies prior to bidding.

15.5 Supplier Diversity Participation Waiver

15.5.1 The Bidder is required to make a good faith effort to locate and contract with Diverse Firms. If a Bidder has made a good faith effort to secure the required Supplier Diversity Participation and has failed, the Bidder shall submit within forty-eight (48) hours of the time for receipt of bids to the University Contracting Officer, the information requested in "Application for Supplier Diversity Participation Waiver." The Contracting Officer will review the Bidder's actions as set forth in the Bidder's "Application for Waiver" and any other factors deemed relevant by the Contracting Officer to determine if a good faith effort has been made to meet the Supplier Diversity Goal(s). If the Bidder is judged not to have made a good faith effort, the Bid may be rejected. Bidders who demonstrate that they have made a good faith effort to meet the Supplier Diversity Goal(s) may be awarded the contract regardless of the actual percent of Supplier Diversity Participation, provided that the Bid is otherwise acceptable and is determined to be the lowest, responsive, responsible Bid.

15.5.2 To determine the good faith effort of the Bidder, the Contracting Officer may evaluate factors including, but not limited to, the following:

15.5.2.1 The Bidder's attendance at pre-proposal meetings scheduled to inform Diverse Firms of contracting and subcontracting opportunities and responsibilities associated with Supplier Diversity Participation.

15.5.2.2 The Bidder's advertisements in general circulation trade association, and diverse (minority) focused media concerning subcontracting opportunities.

15.5.2.3 The Bidder's written notice to specific Diverse Firms that their services were being solicited in sufficient time to allow for their effective participation.

15.5.2.4 The Bidder's follow-up attempts to the initial solicitation(s) to determine with certainty whether Diverse Firms were interested.

15.5.2.5 The Bidder's efforts to divide the work into packages suitable for subcontracting to Diverse Firms.

15.5.2.6 The Bidder's efforts to provide interested Diverse Firms with sufficiently detailed information about the Drawings, Specifications and requirements of the contract, and clear scopes of work for the Diverse Firms to bid on.

15.5.2.7 The Bidder's efforts to solicit for specific sub-bids from Diverse Firms in good faith. Documentation should include names, addresses, and telephone numbers of Diverse Firms contacted, a description of all information provided to the Diverse Firms, and an explanation as to why agreements were not reached.

15.5.2.8 The Bidder's efforts to locate Diverse Firms not on the directory list and assist Diverse Firms in becoming certified as such.

15.5.2.9 The Bidder's initiatives to encourage and develop participation by Diverse Firms.

15.5.2.10 The Bidder's efforts to help Diverse Firms overcome legal or other barriers impeding the participation of Diverse Firms in the construction contract.

15.5.2.11 The availability of Diverse Firms and the adequacy of the Bidder's efforts to increase the participation of such business provided by the persons and organizations consulted by the Bidder.

15.6 Submittal of Forms

15.6.1 Within forty-eight (48) hours of the time for receipt of bids, the apparent low Bidder shall submit to the University Contracting Officer all Supplier Diversity Compliance Evaluation Form(s), and/or Application for Waiver with supporting information, and an "Affidavit of Supplier Diversity Participation" for every Diverse Firm the Bidder intends to award work on the contract. The affidavit will be signed by both the Bidder and the Diverse Firm. Failure to submit the documents in the time indicated may result in rejection of the Bid.

15.7 Additional Bid/Proposer Information

15.7.1 The Contracting Officer reserves the right to request from the apparent low Bidder additional information regarding the Bidder's proposed Supplier Diversity Participation and supporting documentation. The Bidder shall respond in writing to the Contracting Officer within twenty-four (24) hours of a request.

15.7.2 The Contracting Officer reserves the right to request additional information after the Bidder has responded to prior requests. This information may include follow up and/or clarification of the information previously submitted.

15.7.3 The Owner reserves the right to consider additional Supplier Diversity Participation submitted by the Bidder after bids are opened. The Owner may elect to waive the good faith effort requirement if such additional participation achieves the Supplier Diversity Goal.

15.7.4 The Bidder shall provide to the Owner information related to the Supplier Diversity Participation included in the Bidder's proposal, including, but not limited to, the complete Application for Waiver, evidence of certification of participating Diverse firms, dollar amount of participation of Diverse Firms, information supporting a good faith effort as described above, and a list of all Diverse Firms that submitted bids to the Bidder with the Diverse Firm's price, and the name and the price of the firm awarded the scope of work.

16. List of Subcontractors

16.1 If a list of subcontractors is required on the Bid Form, the Bidder shall list the name, city, and state of the firm(s) that will accomplish that portion of the contract requested in the space provided. This list is separate from both the list of Diverse Firms required in Section 15.2 and the complete list of subcontractors required in Section 10.1 of this document. Should the Bidder choose to perform any of the listed portions of the work with its own forces, the Bidder shall enter its own name, city, and state in the space provided. If acceptance or non-acceptance of alternates will affect the designation of a subcontractor, the Bidder shall provide that information on the Bid Form.

16.2 Failure of the Bidder to supply the list of subcontractors required or the listing of more than one subcontractor for any category without designating the portion of the work to be performed by each, shall be grounds for the rejection of the Bid. The Bidder can petition the Owner to change a listed subcontractor within forty-eight (48) hours of the Bid opening. The Owner reserves the right to make the final determination on a petition to change a subcontractor. The Owner will consider factors such as clerical and mathematical errors in the Bid, a listed subcontractor's inability to perform the work, etc. Any request to change a listed subcontractor shall include at a minimum, a Bid sheet showing tabulation of the Bid; all subcontractor bids with documentation of the time they were received by the contractor; and a letter from the listed subcontractor on their letterhead stating why they cannot perform the work if applicable. The Owner reserves the right to ask for additional information.

16.3 Upon award of the contract, the requirements of Article 10 herein and Article 5 of the General Conditions of the Contract for Construction will apply.

University of Missouri

General Conditions

of the

Contract

for

Construction

June 2025 Edition

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TABLE OF ARTICLES

ARTICLE 1
GENERAL PROVISIONS

1.1 Basic Definitions
As used in the Contract Documents, the following terms shall have the meanings and refer to the parties designated in these definitions.

1.1.1 Owner
The Owner is The Curators of the University of Missouri. The Owner may act through its Board of Curators or any duly authorized committee or representative thereof. The Owner may also be referred to herein as "University".

1.1.2 Contracting Officer
The Contracting Officer is the duly authorized representative of the Owner with the authority to execute contracts. Communications to the Contracting Officer shall be forwarded via the Owner's Representative.

1.1.3 Owner's Representative
The Owner's Representative is authorized by the Owner as the administrator of the Contract and will represent the Owner during the progress of the Work. Communications from the Architect to the Contractor and from the Contractor to the Architect shall be through the Owner's Representative, unless otherwise indicated in the Contract Documents.

1.1.4 Architect
When the term "Architect" is used herein, it shall refer to the Architect or the Engineer specified and defined in the Contract for Construction or its duly authorized representative. Communications to the Architect shall be forwarded to the address shown in the Contract for Construction.

1.1.5 Owner's Authorized Agent
When the term "Owner's Authorized Agent" is used herein, it shall refer to an employee or agency acting on the behalf of the Owner's Representative to perform duties related to code inspections, testing, operational systems check, certification or accreditation inspections, or other specialized work.

1.1.6 Contractor
The Contractor is the person or entity with whom the Owner has entered into the Contract for Construction. The term "Contractor" means the Contractor or the Contractor's authorized representative.

1.1.7 Subcontractor and Lower-tier Subcontractor
A Subcontractor is a person or organization who has a contract with the Contractor to perform any of the Work. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or its authorized representative. The term "Subcontractor" also is applicable to those furnishing materials to be incorporated in the Work whether performed at the Owner's site or off site, or both. A lower-tier Subcontractor is a person or organization who has a contract with a Subcontractor or another lower-tier Subcontractor to perform any of the Work at the site. Nothing contained in the Contract Documents shall create contractual relationships between the Owner or the Architect and any Subcontractor or lower-tier Subcontractor of any tier.

1.1.8 Minority Business Enterprises (MBE)
Minority Business Enterprise (MBE) shall have the meaning set forth in Section 37.020, RSMo and the implementing regulations promulgated by the State of Missouri, Office of Administration.

1.1.9 Women Business Enterprise (WBE)
Women Business Enterprise (WBE) shall have the meaning set forth in Section 37.020, RSMo and the implementing regulations promulgated by the State of Missouri Office of Administration.

1.1.10 Service-Disabled Veteran Enterprise (SDVE)
Service-Disabled Veteran Enterprise (SDVE) shall have the same meaning as "Service-Disabled Veteran Business" set forth in Section 34.074, RSMo and the implementing regulations promulgated by the State of Missouri, Office of Administration.

1.1.11 MBE/WBE/SDVE Firm
MBE/WBE/SDVE Firm shall mean a business entity that is certified as an MBE, WBE, and/or SDVE by the State of Missouri, Office of Administration.

1.1.12 Work
Work shall mean supervision, labor, equipment, tools, material, supplies, incidentals operations and activities required by the Contract Documents or reasonably inferable by the Contractor therefrom as necessary to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner, and in the best manner known to each respective trade.

1.1.13 Approved
The terms "approved", "equal to", "directed", "required", "ordered", "designated", "acceptable", "compliant", "satisfactory", and similar words or phrases will be understood to have reference to action on the part of the Architect and/or the Owner's Representative.

1.1.14 Contract Documents
The Contract Documents consist of (1) the executed Contract for Construction, (2) these General Conditions of the Contract for Construction, (3) any Supplemental Conditions or Special Conditions identified in the Contract for Construction, (4) the Specifications identified in the Contract for Construction, (5) the Drawings identified in the Contract for Construction, (6) Addenda issued prior to the receipt of bids, (7) Contractor's bid addressed to Owner, including Contractor's completed Qualification Statement, (8) Contractor's Performance Bond and Contractor's Payment Bond, (9) Notice to Proceed, (10)

and any other exhibits and/or post bid adjustments identified in the Contract for Construction, (11) Advertisement for Bid, (12) Information for Bidders, and (13) Change Orders issued after execution of the Contract. All other documents and technical reports and information are not Contract Documents, including without limitation, Shop Drawings, and Submittals.

1.1.15 Contract
The Contract Documents form the Contract and are the exclusive statement of agreement between the parties. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Owner and a Subcontractor or any lower-tier Subcontractor.

1.1.16 Change Order
The Contract may be amended or modified without invalidating the Contract only by a Change Order, subject to the limitations in Article 7 and elsewhere in the Contract Documents. A Change Order is a written instrument signed by the Owner and the Contractor stating their agreement to a change in the Work, the amount of the adjustment to the Contract Sum, if any, and the extent of the adjustment to the Contract Time, if any. Agreement to any Change Order shall constitute a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments of the Contract Sum, time and schedule.

1.1.17 Substantial Completion
The terms "Substantial Completion" or "substantially complete" as used herein shall be construed to mean the completion of the entire Work, including all submittals required under the Contract Documents, except minor items which in the opinion of the Architect, and/or the Owner's Representative will not interfere with the complete and satisfactory use of the facilities for the purposes intended.

1.1.18 Final Completion
The date when all punch list items are completed, including all closeout submittals and approval by the Architect is given to the Owner in writing.

1.1.19 Supplemental and Special Conditions
The terms "Supplemental Conditions" or "Special Conditions" shall mean the part of the Contract Documents which amend, supplement, delete from, or add to these General Conditions.

1.1.20 Day
The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

1.1.21 Knowledge
The terms "knowledge," "recognize" and "discover" their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows or should know, recognizes, or should recognize and discovers or should discover in exercising the care, skill, and diligence of a diligent and prudent contractor familiar with the Work. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a diligent and prudent contractor familiar with the Work.

1.1.22 Punch List
"Punch List" means the list of items, prepared in connection with the inspection(s) of the Project by the Owner's Representative or the Architect in connection with Substantial Completion of the Work or a portion of the Work, which the Owner's Representative or the Architect has designated as remaining to be performed, completed, or corrected before the Work will be accepted by the Owner.

1.1.23 Force Majeure
An event or circumstance that could not have been reasonably anticipated and is out of the control of both the Owner and the Contractor.

1.2 Specifications and Drawings
1.2.1 The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction system, standards and workmanship and performance of related services for the Work identified in the Contract for Construction. Specifications are separated into titled divisions for convenience of reference only. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Such separation will not operate to make the Owner or the Architect an arbiter of labor disputes or work agreements.

1.2.2 The Drawings herein referred to, consist of drawings prepared by the Architect, and are enumerated in the Contract Documents.

1.2.3 Drawings are intended to show general arrangements, design, and dimensions of work and are partly diagrammatic. Dimensions shall not be determined by scale or rule. If figured dimensions are lacking, they shall be supplied by the Architect on the Contractor's written request to the Owner's Representative.

1.2.4 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complimentary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall by required only to the extent consistent with the Contract

Documents and reasonably inferable from them as being necessary to produce the intended results.

1.2.5 In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement; either or both in accordance with the Owner's Representative's interpretation. On the Drawings, given dimensions shall take precedence over scaled measurements and large-scale drawings over small scale drawings. Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Work site and shall be responsible for the correctness of such measurements. Any difference which may be found shall be submitted to the Owner's Representative and the Architect for resolution before proceeding with the Work. If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Owner's Representative and the Architect before making the change.

1.2.6 Data in the Contract Documents concerning lot size, ground elevations, present obstructions on or near the site, locations and depths of sewers, conduits, pipes, wires, etc., position of sidewalks, curbs, pavements, etc., and nature of ground and subsurface conditions have been obtained from sources the Architect believes reliable, but the Architect and the Owner do not represent or warrant that this information is accurate or complete. The Contractor shall verify such data to the extent possible through normal construction procedures, including but not limited to contacting utility owners and by prospecting.

1.2.7 Only Work included in the Contract Documents is authorized, and the Contractor shall do no work other than that described therein.

1.2.8 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. The Contractor represents that it has performed its own investigation and examination of the Work site and its surroundings and satisfied itself before entering into this Contract as to:

.1 conditions bearing upon transportation, disposal, handling, and storage of materials;
.2 the availability of labor, materials, equipment, water, electrical power, utilities and roads;
.3 uncertainties of weather, river stages, flooding and similar characteristics of the site;
.4 conditions bearing upon security and protection of material, equipment, and Work in progress;
.5 the form and nature of the Work site, including the surface and sub-surface conditions;
.6 the extent and nature of Work and materials necessary for the execution of the Work and the remedying of any defects therein; and
.7 the means of access to the site and the accommodations it may require and, in general, shall be deemed to have obtained all information as to risks, contingencies and other circumstances.
.8 the ability to complete work without disruption to normal campus activities, except as specifically allowed in the Contract Documents.

The Owner assumes no responsibility or liability for the physical condition or safety of the Work site, or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.

1.2.9 Drawings, specifications, and copies thereof furnished by the Owner are and shall remain the Owner's property. They are not to be used on another project and, with the exception of one contract set for each party to the Contract, shall be returned to the Owner's Representative on request, at the completion of the Work.

1.3 Required Provisions Deemed Inserted

Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein; and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the written application of either party the Contract shall forthwith be physically amended to make such insertion or correction.

ARTICLE 2
OWNER

2.1 Information and Services Required of Owner

2.1.1 Permits and fees are the responsibility of the Contractor under the Contract Documents, unless specifically stated in the Contract Documents that the Owner will secure and pay for specific necessary approvals, easements, assessments, and charges required for construction, use or occupancy of permanent structures, or for permanent changes in existing facilities.

2.1.2 When requested in writing by the Contractor, information or services under the Owner's control, which are reasonably necessary to perform the Work, will be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.

2.2 Owner's Right to Stop the Work

2.2.1 If the Contractor fails to correct Work which is not in strict accordance with the requirements of the Contract

Documents or fails to carry out Work in strict accordance with the Contract Documents, the Owner's Representative may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work will not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. The Owner's lifting of Stop Work Order shall not prejudice the Owner's right to enforce any provision of this Contract.

2.3 Owner's Right to Carry Out the Work

2.3.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven (7) day period after receipt of a written notice from the Owner to correct such default or neglect, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default or neglect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to Owner. However, such notice shall be waived in the event of an emergency with the potential for property damage or the endangerment of students, faculty, staff, the public or construction personnel, at the sole discretion of the Owner.

2.3.2 In the event the Contractor has not satisfactorily completed all items on the Punch List within thirty (30) days of its receipt, the Owner reserves the right to complete the Punch List without further notice to the Contractor or its surety. In such case, the Owner shall be entitled to deduct from payments then or thereafter due the Contractor the cost of completing the Punch List items, including compensation for the Architect's additional services. If payments then or thereafter due Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2.4 Extent of Owner Rights

2.4.1 The rights stated in Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (1) granted in the Contract Documents, (2) at law or (3) in equity.

2.4.2 In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

ARTICLE 3
CONTRACTOR

3.1 Contractor's Warranty

3.1.1 The Contractor warrants all equipment and materials furnished, and work performed, under this Contract, against defective materials and workmanship for a period of twelve months after acceptance as provided in this Contract, unless a longer period is specified, regardless of whether the same were furnished or performed by the Contractor or any Subcontractors of any tier. Upon written notice from the Owner of any breach of warranty during the applicable warranty period due to defective material or workmanship, the affected part or parts thereof shall be repaired or replaced by the Contractor at no cost to the Owner. Should the Contractor fail or refuse to make the necessary repairs, replacements, and tests when requested by the Owner, the Owner may perform, or cause the necessary work and tests to be performed, at the Contractor's expense, or exercise the Owner's rights under Article 14.

3.1.2 Should one or more defects mentioned above appear within the specified period, the Owner shall have the right to continue to use or operate the defective part or apparatus until the Contractor makes repairs or replacements or until such time as it can be taken out of service without loss or inconvenience to the Owner.

3.1.3 The above warranties are not intended as a limitation but are in addition to all other express warranties set forth in this Contract and such other warranties as are implied by law, custom, and usage of trade. The Contractor, and its surety or sureties, if any, shall be liable for the satisfaction and full performance of the warranties set forth herein.

3.1.4 Neither the final payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner, nor expiration of warranty stated herein, will constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any responsibility for non-conforming work. The Contractor shall immediately remedy any defects in the Work and pay for any damage to other Work resulting therefrom upon written notice from the Owner. Should the Contractor fail or refuse to remedy the non-conforming work, the Owner may perform, or cause to be performed all actions necessary to bring the Work into conformance with the Contract Documents at the Contractor's expense.

3.1.5 The Contractor agrees to defend, indemnify, and save harmless The Curators of the University of Missouri, their officers, agents, employees, and volunteers, from and against all loss or expense from any injury or damages to property of others suffered or incurred on account of any breach of the aforesaid obligations and covenants. The Contractor agrees to investigate, handle, respond to and provide defense for and defend against any such liability, claims, and demands at the sole expense of the Contractor, or at the option of the

University, agrees to pay to or reimburse the University for the defense costs incurred by the University in connection with any such liability claims, or demands. The parties hereto understand and agree that the University is relying on and does not waive or intend to waive by any provision of this Contract, any monetary limitations or any other rights, immunities, and protections provided by the State of Missouri, as from time to time amended, or otherwise available to the University, or its officers, employees, agents or volunteers.

3.2 Compliance with Laws, Regulations, Permits, Codes, and Inspections

3.2.1 The Contractor shall, without additional expense to the Owner, comply with all applicable laws, ordinances, rules, permit requirements, codes, statutes, and regulations (which may be collectively referred to as "laws").

3.2.2 Since the Owner is an instrumentality of the State of Missouri, municipal, or political subdivision, ordinances, zoning ordinances, and other like ordinances are not applicable to construction on the Owner's property, and the Contractor will not be required to submit plans and specifications to any municipal or political subdivision authority to obtain construction permits or any other licenses or permits from or submit to, inspection by any municipality or political subdivision relating to the construction on the Owner's property, unless required by the Owner in these Contract Documents or otherwise in writing.

3.2.3 All fees, permits, inspections, or licenses required by municipality or political subdivision for operation on property not belonging to the Owner, shall be obtained by and paid for by the Contractor. The Contractor, of its own expense, is responsible to ensure that all inspections required by said permits or licenses on property, easements, or utilities not belonging to the Owner are conducted as required therein. All connection charges, assessments or transportation fees as may be imposed by any utility company or others are included in the Contract Sum and shall be the Contractor's responsibility.

3.2.4 If the Contractor has knowledge that any Contract Documents are at variance with any laws, including Americans with Disabilities Act – Standards for Accessible Design, ordinances, rules, regulations, or codes applying to the Work, Contractor shall promptly notify the Architect and the Owner's Representative, in writing, and any necessary changes will be adjusted as provided in the Contract Documents. However, it is not the Contractor's primary responsibility to ascertain that the Contract Documents are in accordance with applicable laws, unless such laws bear upon performance of the Work.

3.3 Anti-Kickback

3.3.1 No member or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

3.3.2 No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contract or any Subcontract of any tier in connection with the construction of the Work shall have a financial interest in this Contract or in any part thereof, any material supply contract, Subcontract of any tier, insurance contract, or any other contract pertaining to the Work.

3.4 Supervision and Construction Procedures

3.4.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work under the Contract. The Contractor shall supply sufficient and competent supervision and personnel, and sufficient material, plant, and equipment to prosecute the Work with diligence to ensure completion thereof within the time specified in the Contract Documents, and shall pay when due any laborer, Subcontractor of any tier, or supplier.

3.4.2 The Contractor, if an individual, shall give the Work an adequate amount of personal supervision, and if a partnership, corporation, r joint venture or other business entity, the Work shall be given an adequate amount of personal supervision by a partner or executive officer, as determined by the Owner's Representative.

3.4.3 The Contractor and each of its Subcontractors of any tier shall submit to the Owner such schedules of quantities and costs, progress schedules in accordance with 3.18this document, payrolls, reports, estimates, records, and other data as the Owner may request concerning Work performed or to be performed under the Contract.

3.4.4 The Contractor shall be represented at the site by a competent superintendent from the beginning of the Work until its final acceptance, whenever Contract Work is being performed, unless otherwise permitted in writing by the Owner's Representative. The superintendent for the Contractor shall exercise general supervision over the Work and such superintendent shall have decision making authority of the Contractor. Communications given to the superintendent shall be binding as if given to the Contractor. The superintendent shall not be changed by the Contractor without approval from the Owner's Representative.

3.4.5 The Contractor shall establish and maintain a permanent benchmark to which access may be had during progress of the Work, and Contractor shall establish all lines

and levels, and shall be responsible for the correctness of such. The Contractor shall be fully responsible for all layout work for the proper location of Work in strict accordance with the Contract Documents.

3.4.6 The Contractor shall establish and be responsible for wall and partition locations. If applicable, separate contractors shall be entitled to rely upon these locations and for setting their sleeves, openings, or chases.

3.4.7 The Contractor's scheduled outage/tie-in plan, time, and date for any utilities is subject to approval by the Owner's Representative. Communication with the appropriate entity and planning for any scheduled outage/tie-in of utilities shall be the responsibility of the Contractor. Failure of the Contractor to comply with the provisions of this Paragraph shall cause the Contractor to forfeit any right to an adjustment of the Contract Sum or Contract Time for any postponement, rescheduling or other delays ordered by the Owner in connection with such Work. The Contractor shall follow the following procedures for all utility outages/tie-ins or disruption of any building system:

.1 All shutting of valves, switches, etc., shall be by the Owner's personnel.

.2 The Contractor shall submit its preliminary outage/tie-in schedule with its baseline schedule.

.3 The Contractor shall request an outage/tie-in meeting at least two weeks before the outage/tie-in is required.

.4 The Owner's Representative will schedule an outage/tie-in meeting at least one week prior to the outage/tie-in.

3.4.8 The Contractor shall coordinate all Work so there shall be no prolonged interruption of existing utilities, systems, and equipment of the Owner. Any existing plumbing, heating, ventilating, air conditioning, or electrical disconnection necessary, which affect portions of this construction or building or any other building, must be scheduled with the Owner's Representative to avoid any disruption of operation within the building under construction or other buildings or utilities. In no case shall utilities be left disconnected at the end of a workday or over a weekend. Any interruption of utilities, either intentionally or accidentally, shall not relieve the Contractor from repairing and restoring the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.

3.4.9 The Contractor shall be responsible for repair of damage to property on or off the project occurring during construction of project, and all such repairs shall be made to meet code requirements or to the satisfaction of the Owner's Representative if code is not applicable.

3.4.10 The Contractor shall be responsible for all shoring required to protect the Work or adjacent property and shall pay for any damage caused by failure to shore or by improper shoring or by failure to give proper notice. Shoring shall be removed only after completion of permanent supports.

3.4.11 The Contractor shall maintain at the Contractor's own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for students, faculty, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

3.4.12 During the performance of the Work, the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences, and other devices appropriately located on site which shall give proper and understandable warning to all persons of danger of entry onto land, structure, or equipment, within the limits of the Contractor's work area.

3.4.13 The Contractor shall pump, bail, or otherwise keep any general excavations free of water. The Contractor shall keep all areas free of water before, during and after concrete placement. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials installed, or to be installed by the Contractor.

3.4.14 The Contractor shall be responsible for care of the Work and must protect same from damage of defacement until acceptance by the Owner. All damaged or defaced Work shall be repaired or replaced to the Owner's satisfaction, without cost to the Owner.

3.4.15 When requested by the Owner's Representative, the Contractor, at no extra charge, shall provide scaffolds or ladders in place as may be required by the Architect or the Owner for examination or inspection of Work in progress or completed.

3.4.16 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors of any tier and their agents and employees, and any other entity or persons performing portions of the Work.

3.4.17 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Owner's Representative or the Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

3.4.18 The Contractor shall be responsible for inspection of portions of the Work already performed under this Contract to determine that such portions are compliant and in proper condition to receive subsequent Work.

3.5 Use of Site

3.5.1 The Contractor shall limit operations and storage of material to the area within the Work limit lines shown on Drawings, except as necessary to connect to exiting utilities, shall not encroach on neighboring property, and shall exercise caution to prevent damage to existing structures.

3.5.2 Only materials and equipment, which are to be used directly in the Work, shall be brought to and stored on the Work site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Work site. Protection of construction materials and equipment stored at the Work site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.

3.5.3 No project signs shall be erected without the written approval of the Owner's Representative.

3.5.4 The Contractor shall ensure that the Work is at all times performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. Particular attention shall be paid to access for emergency vehicles, including fire trucks. Wherever there is the possibility of interfering with normal emergency vehicle operations, the Contractor shall obtain permission from both campus and municipal emergency response entities prior to limiting any access. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, the Contractor shall not interfere with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of the Work or (2) the Work in the event of partial occupancy. The Contractor shall assume full responsibility for any damage to the property comprising the Work or to the owner or occupant of any adjacent land or areas resulting from the performance of the Work.

3.5.5 The Contractor shall not permit any workers to use any existing facilities at the Work site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by Owner. The Contractor, Subcontractors of any tier, suppliers and employees shall comply with instructions or regulations of the Owner's Representative governing access to, operation of, and conduct while in or on the premises and shall perform all Work required under the Contract Documents in such a manner as not to unreasonably interrupt or interfere with the conduct of the Owner's operations. Any request for Work, a suspension of Work or any other request or directive received by the Contractor from occupants of existing buildings shall be referred to the Owner's Representative for determination.

3.5.6 The Contractor and the Subcontractor of any tier shall have its' name, acceptable abbreviation or recognizable logo and the name of the city and state of the mailing address of the principal office of the company, on each motor vehicle and motorized self-propelled piece of equipment which is used in connection with the project. The signs are required on such vehicles during the time the Contractor is working on the project.

3.6 Review of Contract Documents and Field Conditions by Contractor

3.6.1 The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Architect and the Owner and shall at once report in writing to the Architect and the Owner's Representative any errors, inconsistencies or omissions discovered. If the Contractor performs any construction activity which it knows or should have known involves a recognized error, inconsistency, or omission in the Contract Documents without such written notice to the Architect and the Owner's Representative, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

3.6.2 The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported in writing to the Architect and the Owner's Representative within twenty-four (24) hours. During the progress of the Work, the Contractor shall verify all field measurements prior to fabrication of building components or equipment and proceed with the fabrication to meet field conditions. The Contractor shall consult all Contract Documents to determine the exact location of all work and verify spatial relationships of all work. Any question concerning said location or spatial relationships shall be submitted to the Owner's Representative. Specific locations for equipment, pipelines, ductwork and other such items of work, where not dimensioned on plans, shall be determined in consultation with the Owner's Representative and the Architect. The Contractor shall be responsible for the proper fitting of the Work in place.

3.6.3 The Contractor shall provide, at the proper time, such material as required for support of the Work. If openings or chases are required, whether shown on Drawings or not, the Contractor shall see they are properly constructed. If required openings or chases are omitted, the Contractor shall cut them at the Contractors own expense, but only as directed by the Architect, through the Owner's Representative.

3.6.4 Should the Contract Documents fail to particularly describe materials or goods to be used, it shall be the duty of the Contractor to inquire of the Architect and the Owner's Representative what is to be used and to supply it at the Contractor's expense, or else thereafter replace it to the Owner's Representative's satisfaction. At a minimum, the

Contractor shall provide the quality of materials as generally specified throughout the Contract Documents.

3.7 Cleaning and Removal

3.7.1 The Contractor shall keep the Work site and surrounding areas free from accumulation of waste materials, rubbish, debris, and dirt resulting from the Work and shall clean the Work site and surrounding areas as requested by the Architect and the Owner's Representative, including mowing of grass greater than six (6) inches high. The Contractor shall be responsible for the cost of clean up and removal of debris from premises. The building and premises shall be kept clean, safe, in a workmanlike manner, and in compliance with OSHA standards and code at all times. At completion of the Work, the Contractor shall remove from and about the Work site tools, construction equipment, machinery, fencing, and surplus materials. Further, at the completion of the Work, all dirt, stains, and smudges shall be removed from every part of the building, all glass in doors and windows shall be washed, and entire Work shall be left broom clean in a finished state ready for occupancy. The Contractor shall advise his Subcontractors of any tier of this provision, and the Contractor shall be fully responsible for leaving the premises in a finished state ready for use to the satisfaction of the Owner's Representative. If the Contractor fails to comply with the provisions of this Paragraph, the Owner may do so, and the cost thereof shall be charged to the Contractor.

3.8 Cutting and Patching

3.8.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

3.8.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.8.3 If the Work involves renovation and/or alteration of existing improvements, the Contractor acknowledges that cutting and patching of the Work is essential for the Work to be successfully completed. The Contractor shall perform any cutting, altering, patching, and/or fitting of the Work necessary for the Work and the existing improvements to be fully integrated and to present the visual appearance of an entire, completed, and unified project. In performing any Work which requires cutting or patching, the Contractor shall use its best efforts to protect and preserve the visual appearance and aesthetics of the Work to the reasonable satisfaction of both the Owner's Representative and the Architect.

3.9 Indemnification

3.9.1 To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, the Architect, the Architect's consultants, and the agents, employees, representatives, insurers and re-insurers of any of the foregoing (hereafter collectively referred to as the "Indemnitees") from and against claims, damages (including loss of use of the Work itself), punitive damages, penalties and civil fines unless expressly prohibited by law, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from performance of the Work to the extent caused in whole or in part by negligent acts or omissions or other fault of the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by the negligent acts or omissions or other fault of a party indemnified hereunder. The Contractor's obligations hereunder are in addition to and shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that the Owner may possess. If one or more of the Indemnitees demand performance by the Contractor of obligations under this Paragraph or other provisions of the Contract Documents and if the Contractor refuses to assume or perform, or delays in assuming or performing the Contractor's obligations, Contractor shall pay each Indemnitee who has made such demand its respective attorneys' fees, costs, and other expenses incurred in enforcing this provision. The defense and indemnity required herein shall be a binding obligation upon the Contractor whether or not an Indemnitee has made such demand. Even if a defense is successful to a claim or demand for which the Contractor is obligated to indemnify the Indemnitees from under this Paragraph, the Contractor shall remain liable for all costs of defense.

3.9.2 The indemnity obligations of the Contractor under this Section 3.9 shall survive termination of this Contract or final payment thereunder. In the event of any claim or demand made against any party which is entitled to be indemnified hereunder, the Owner may in its sole discretion reserve, return or apply any monies due or to become due the Contractor under the Contract for the purpose of resolving such claims; provided, however, that the Owner may release such funds if the Contractor provides the Owner with reasonable assurance of protection of the Owner's interests. The Owner shall in its sole discretion determine if such assurances are reasonable. The Owner reserves the right to control the defense and settlement of any claim, action or proceeding which the Contractor has an obligation to indemnify the Indemnitees against.

3.9.3 In claims against any person or entity indemnified under this Section 3.9 by an employee of the Contractor, a Subcontractor of any tier, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Section 3.9

shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor of any tier under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

3.9.4 The obligations of the Contractor under Paragraph 3.9.1 shall not extend to the liability of the Architect, the Architect's agents or employees, arising out of the preparation and approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or Specifications.

3.10 Patents

3.10.1 The Contractor shall hold and save harmless the Owner and its officers, agents, servants, and employees from liability of any nature or kind, including cost and expense, for, or on account of, any patented or otherwise protected invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

3.10.2 If the Contractor uses any design, device, or material covered by letters patent or copyright, the Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device, or material. It is mutually agreed and understood, without exception, that the Contract Sum include, and the Contractor shall pay all royalties, license fees or costs arising from the use of such design, device, or material in any way involved in the Work. The Contractor and/or sureties shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of such patented or copyrighted design, device, or material or any trademark or copyright in connection with Work agreed to be performed under this Contract and shall indemnify the Owner for any cost, expense, or damage it may be obligated to pay by reason of such infringement at any time during the prosecution of the Work or after completion of the Work.

3.11 Delegated Design

3.11.1 If the Contract Documents specify the Contractor is responsible for the design of any Work as part of the project, then the Contractor shall procure all design services and certifications necessary to complete the Work as specified, from a design professional licensed in the State of Missouri. The signature and seal of that design professional shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals related to the Work. The design professional shall maintain insurance as required per Article 11.

3.12 Materials, Labor, and Workmanship

3.12.1 Materials and equipment incorporated into the Work shall strictly conform to the Contract Documents and representations and approved Samples provided by Contractor and shall be of the most suitable grade of their respective kinds for their respective uses and shall be fit and sufficient for the purpose intended, merchantable, of good new material and workmanship, and free from defect. Workmanship shall be in accordance with the highest standard in the industry and free from defect in strict accordance with the Contract Documents.

3.12.2 Materials and fixtures shall be new and of latest design unless otherwise specified and shall provide the most efficient operating and maintenance costs to the Owner. All Work shall be performed by competent workers and shall be of best quality.

3.12.3 The Contractor shall carefully examine the Contract Documents and shall be responsible for the proper fitting of his material, equipment, and apparatus into the building.

3.12.4 The Contractor shall base its bid only on the Contract Documents.

3.12.5 Materials and workmanship shall be subject to inspection, examination, and testing by the Architect and the Owner's Representative at any and all times during manufacture, installation, and construction of any of them, at places where such manufacture, installation, or construction is performed.

3.12.6 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

3.12.7 Unless otherwise specifically noted, the Contractor shall provide and pay for supervision, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

3.12.8 Substitutions

3.12.8.1 A substitution is a Contractor proposal of an alternate product or method in lieu of what has been specified or shown in the Contract Documents, which is not an "or equal" as set forth in Section 3.13.

3.12.8.2 The Contractor may make a proposal to the Architect and the Owner's Representative to use substitute products or methods as set forth herein, but the Architect's and the Owner's Representative's decision concerning acceptance of a substitute shall be final. The Contractor must do so in writing and setting forth the following:

.1 Full explanation of the proposed substitution and submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution.

.2 Reasons the substitution is advantageous and necessary, including the benefits to the Owner and the Work in the event the substitution is acceptable.

.3 The adjustment, if any, in the Contract Sum, in the event the substitution is acceptable.

.4 The adjustment, if any, in the time of completion of the Contract and the construction schedule in the event the substitution is acceptable.

.5 An affidavit stating that (a) the proposed substitution conforms to and meets all of the Contract Document requirements and is code compliant, except as specifically disclosed and set forth in the affidavit and (b) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect. Proposals for substitutions shall be submitted to the Architect and the Owner's Representative in sufficient time to allow the Architect and the Owner's Representative no less than ten (10) working days for review. No substitution will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated herein.

3.12.8.3 Substitutions may be rejected without explanation at the Owner's sole discretion and will be considered only under one or more of the following conditions:

.1 Required for compliance with interpretation of code requirements or insurance regulations then existing;

.2 Unavailability of specified products, through no fault of the Contractor;

.3 Material delivered fails to comply with the Contract Documents;

.4 Subsequent information discloses inability of specified products to perform properly or to fit in designated space;

.5 Manufacturer/fabricator refuses to certify or guarantee performance of specified product as required; or

.6 When in the judgment of the Owner or the Architect, a substitution would be substantially to the Owner's best interests, in terms of cost, time, or other considerations.

3.12.8.4 Whether or not any proposed substitution is accepted by the Owner or the Architect, the Contractor shall reimburse the Owner for any fees charged by the Architect or other consultants for evaluating each proposed substitution.

3.13 Approved Equal

3.13.1 Whenever in the Contract Documents any article, appliance, device, or material is designated by the name of a manufacturer, vendor, or by any proprietary or trade name, the words "or approved equal," shall automatically follow and shall be implied unless specifically indicated otherwise. The standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner's Representative and the Architect they are equal in design, appearance, spare parts availability, strength, durability, usefulness, serviceability, operation cost, maintenance cost, and convenience for the purpose intended. Any general listings of approved manufacturers in any Contract Document shall be for informational purposes only and it shall be the Contractor's sole responsibility to ensure that any proposed "or equal" complies with the requirements of the Contract Documents and is code compliant.

3.13.2 The Contractor shall submit to the Architect and the Owner's Representative a written and full description of the proposed "or equal" including all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and similar information demonstrating that the proposed "or equal" strictly complies with the Contract Documents. The Architect or the Owner's Representative shall take appropriate action with respect to the submission of a proposed "or equal" item. If Contractor fails to submit proposed "or equals" as set forth herein, it shall waive any right to supply such items. The Contract Sum and Contract Time shall not be adjusted as a result of any failure by Contractor to submit proposed "or equals" as provided for herein. All documents submitted in connection with preparing an "or equal" shall be clearly and obviously marked as a proposed "or equal" submission.

3.13.3 No approvals or action taken by the Architect or Owner's Representative shall relieve the Contractor from its obligation to ensure that an "or equal" article, appliance, devise, or material strictly complies with the requirements of the Contract Documents. The Contractor shall not propose "or equal" items in connection with Shop Drawings or other Submittals, and the Contractor acknowledges and agrees that no approvals or action taken by the Architect or Owner's Representative with respect to Shop Drawings or other Submittals shall constitute approval of any "or equal" item or relieve the Contractor from its sole and exclusive responsibility. Any changes required in the details and dimensions indicated in the Contract Documents for the incorporation or installation of any "or equal" item supplied by the Contractor shall be properly made and approved by the Architect at the expense of the Contractor. No "or equal" items will be permitted for components of or extensions to existing systems when, in the opinion of the Architect, the named manufacturer must be provided in order to ensure compatibility with the existing systems, including, but not limited to, mechanical systems, electrical systems, fire alarms, smoke detectors, etc. No action will be taken by the Architect with respect to proposed "or equal" items prior to receipt of bids, unless otherwise noted in the Special Conditions.

3.14 Shop Drawings, Product Data, Samples, and Coordination Drawings/BIM Models

3.14.1 Shop Drawings are drawings, diagrams, schedules, and other data specifically prepared for the Work by the Contractor or a Subcontractor, sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

3.14.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

3.14.3 Samples are physical samples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.14.4 Coordination Drawings are drawings for the integration of the Work, including work first shown in detail on Shop Drawings or product data. Coordination Drawings show sequencing and relationship of separate units of work which must interface in a restricted manner to fit in the space provided, or function as indicated. Coordination Drawings are the responsibility of the Contractor and are submitted for informational purposes. The Special Conditions will state whether Coordination Drawings are required. BIM models may be used for coordination in lieu of Coordination Drawings at the Contractor's discretion, unless required in the Special Conditions. The final Coordination Drawings/BIM Model will not change the Contract Documents, unless approved by a fully executed Change Order describing the specific modifications that are being made to the Contract Documents.

3.14.5 Shop Drawings, Coordination Drawings/BIM Models, Product Data, Samples, and similar submittals (collectively referred to as "Submittals") are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

3.14.6 The Contractor shall schedule submittal of Shop Drawings and Product Data to the Architect so that no delays will result in delivery of materials and equipment, advising the Architect of priority for checking of Shop Drawings and Product Data, but a minimum of two weeks shall be provided for this purpose. Because time is of the essence in this Contract, unless noted otherwise in the Special Conditions or Technical Specifications, all Submittals, Shop Drawings and Samples must be submitted as required to maintain the Contractor's plan for proceeding but must be submitted within ninety (90) days of the Notice to Proceed. If the Contractor believes that this milestone is unreasonable for any submittal, the Contractor shall request an extension of this milestone, within sixty (60) days of Notice to Proceed, for each submittal that cannot meet the milestone. The request shall contain a reasonable explanation as to why the ninety (90)-day milestone is unrealistic and shall specify a date on which the submittal will be provided, for approval by the Owner's Representative. Failure of the Contractor to comply with this Section may result in delays in the submittal approval process and/or charges for expediting approval, both of which will be the responsibility of the Contractor.

3.14.7 The Contractor, at its own expense, shall submit Samples required by the Contract Documents with reasonable promptness as to cause no delay in the Work or the activities of separate contractors and no later than twenty (20) days before materials are required to be ordered for scheduled delivery to the Work site. Samples shall be labeled to designate material or products represented, grade, place of origin, name of producer, name of the Contractor and the name and number of the Owner's project. Quantities of Samples shall be twice the number required for testing so that the Architect can return one set of the Samples. Materials delivered before receipt of Architect's approval may be rejected by the Architect and in such event, the Contractor shall immediately remove all such materials from the Work site. When requested by the Architect or the Owner's Representative, Samples of finished masonry and field applied paints and finishes shall be located as directed and shall include sample panels built at the site of approximately twenty (20) square feet each.

3.14.8 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples, or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved Submittals.

3.14.9 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents such Submittals strictly comply with the requirements of the Contract Documents and that the Contractor has determined and verified field measurements and field construction criteria related thereto, that materials are fit for their intended use and that the fabrication, shipping, handling, storage, assembly and installation of all materials, systems and equipment are in accordance with best practices in the industry and are in strict compliance with any applicable requirements of the Contract Documents. The Contractor shall also coordinate each Submittal with other Submittals.

3.14.10 The Contractor shall be responsible for the correctness and accuracy of the dimensions, measurements and other information contained in the Submittals.

3.14.11 Each Submittal will bear a stamp or specific indication that the Submittal complies with the Contract Documents and the Contractor has satisfied its obligations under the Contract Documents with respect to the Contractor's review and approval of that Submittal. Each Submittal shall bear the signature of the representative of the Contractor who approved the Submittal, together with the Contractor's name, Owner's name, number of the Project, and the item name and specification section number.

3.14.12 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by the Architect's approval thereof. Specifically, but not by way of limitation, the Contractor acknowledges that the Architect's approval of Shop Drawings shall not relieve the Contractor for responsibility for errors and omissions in the Shop Drawings since the Contractor is responsible for the correctness of dimensions, details and the design of adequate connections and details contained in the Shop Drawings.

3.14.13 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous Submittals.

3.14.14 The Contractor represents and warrants that all Shop Drawings shall be prepared by persons and entities possessing expertise and experience in the trade for which the Shop Drawing is prepared and, if required by the Architect or applicable laws, by a licensed engineer or other design professional.

3.15 Record Drawings

3.15.1 The Contractor shall maintain a set of Record Drawings on site in good condition and shall use colored pencils to mark up said set with "record information" in a legible manner to show: (1) bidding addendums, (2) executed Change Orders, (3) deviations from the Drawings made during construction; (4) details in the Work not previously shown; (5) changes to existing conditions or existing conditions found to differ from those shown on any existing drawings; (6) the actual installed position of equipment, piping, conduits, light switches, electric fixtures, circuiting, ducts, dampers, access panels, control valves, drains, openings, and stub-outs; and (7) such other information as either the Owner or the Architect may reasonably request. The prints for Record Drawing use will be a set of "blue line" prints provided by the Architect to the Contractor at the start of construction. Upon Substantial Completion of the Work, the Contractor shall deliver all Record Drawings to the Owner and the Architect for approval. If not approved, the Contractor shall make the revisions requested by the Architect or the Owner's Representative. Final payment and any retainage shall not be due and owing to the Contractor until the final Record Drawings marked by the Contractor as required above are delivered to the Owner.

3.16.1 Operating Instructions and Service Manuals

3.16.1 The Contractor shall submit four (4) volumes of operating instructions and service manuals to the Architect before completing 50% of the adjusted contract amount. Payments beyond 50% of the adjusted contract amount may be withheld until all operating instructions and service manuals are received. The operating instructions and service manuals shall contain:

.1 Start-up and Shutdown Procedures: Provide a step-by-step write up of all major equipment. When manufacturer's printed start-up, trouble shooting and shut-down procedures are available, they may be incorporated into the operating manual for reference.

.2 Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.

.3 Equipment List: List of all major equipment as installed shall include model number, capacities, flow rate, and name-plate data.

.4 Service Instructions: The Contractor shall be required to provide the following information for all pieces of equipment.

.4.1 Recommended spare parts including catalog number and name of local suppliers or factory representative.

.4.2 Belt sizes, types, and lengths.

.4.3 Wiring diagrams.

.5 Manufacturer's Certificate of Warranty: Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year from the date of Substantial Completion. Where longer period is required by the Contract Documents, the longer period shall govern.

.6 Parts catalogs: For each piece of equipment furnished, a parts catalog or similar document shall be provided which identifies the components by number for replacement ordering.

3.16.2 Submission

.1 Manuals shall be bound into volumes of standard 8 1/2" x 11" hard binders. Large drawings too bulky to be folded into 8 1/2" x 11" shall be separately bound or folded and in brown envelopes, cross-referenced and indexed with the manuals.

.2 The manuals shall identify the Owner's project name, project number, and include the name and address of the Contractor and major Subcontractors of any tier who were involved with the activity described in that particular manual.

3.17 Taxes

3.17.1 The Contractor shall pay all applicable sales, consumer, use, and similar taxes for the Work which are legally enacted when the bids are received, whether or not yet effective or scheduled to go into effect. However, certain purchases by the Contractor of materials incorporated in or consumed in the Work are exempt from certain sales tax pursuant to Section 144.062, RSMo. The Contractor shall be issued a Project Tax Exemption Certificate for this Work to obtain the benefits of Section 144.062, RSMo.

3.17.2 The Contractor shall furnish this certificate to all Subcontractors, and any person or entity purchasing materials for the Work shall present such certificate to all material suppliers as authorization to purchase, on behalf of the Owner, all tangible personal property and materials to be incorporated into or consumed in the Work and no other on a tax-exempt basis. Such suppliers shall provide to the purchasing party invoices bearing the name of the exempt entity and the project identification number. Nothing in this Section shall be deemed to exempt from any sales or similar tax the purchase of any construction machinery, equipment or tools used in construction, repairing or remodeling facilities for the Owner. All invoices for all personal property and materials purchased under a Project Tax Exemption Certificate shall be retained by the Contractor for a period of five years and shall be subject to audit by the Director of Revenue.

3.17.3 Any excess resalable tangible personal property or materials which were purchased for the project under this Project Tax Exemption Certificate but which were not incorporated into or consumed in the Work shall either be returned to the supplier for credit or the appropriate sales or

use tax on such excess property or materials shall be reported on a return and paid by such purchasing party not later than the due date of the purchasing party's Missouri sales or use tax return following the month in which it was determined that the materials were not used in the Work.

3.17.4 If it is determined that sales tax is owed by the Contractor on property and materials due to the failure of the Owner to revise the certificate expiration date to cover the applicable date of purchase, the Owner shall be liable for the tax owed.

3.17.5 The Owner shall not be responsible for any tax liability due to the Contractor's neglect to make timely orders, payments, etc. or the Contractor's misuse of the Project Tax Exemption Certificate. The Contractor represents that the Project Tax Exemption Certificate shall be used in accordance with Section 144.062, RSMo and the terms of the Project Tax Exemption Certificate. The Contractor shall indemnify the Owner for any loss or expense, including but not limited to, reasonable attorneys' fees, arising out of the Contractor's use of the Project Tax Exemption Certificate.

3.18 Contractor's Construction Schedules

3.18.1 The Contractor, within fifteen (15) days after the issuance of the Notice to Proceed, shall prepare and submit for the Owner's and the Architect's information the Contractor's construction schedule for the Work and shall set forth interim dates for completion of various components of the Work and Work Milestone Dates as defined herein. The schedule shall not exceed time limits current under the Contract Documents, shall be revised on a monthly basis or as requested by the Owner's Representative as required by the conditions of the Work, and shall provide for expeditious and practicable execution of the Work. The Contractor shall conform to the most recent schedule.

3.18.2 The construction schedule shall be in a detailed format satisfactory to the Owner's Representative and the Architect and in accordance with the detailed schedule requirements set forth in this document and the Special Conditions. If the Owner's Representative or the Architect has a reasonable objection to the schedule submitted by Contractor, the construction schedule shall be promptly revised by the Contractor. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays.

3.18.3 As time is of the essence to this Contract, the University expects that the Contractor will take all necessary steps to ensure that the project construction schedule shall be prepared in accordance with the specific requirements of the Special Conditions to this Contract. At a minimum, the Contractor shall comply with the following:

.1 The schedule shall be prepared using Primavera P3, Oracle P6, Microsoft Project or other software acceptable to the Owner's Representative.

.2 The schedule shall be prepared and maintained in CPM format, in accordance with Construction CPM Scheduling, published by the Associated General Contractors of American (AGC).

.3 Prior to submittal to the Owner's Representative for review, the Contractor shall obtain full buy-in to the schedule from all major Subcontractors, in writing if so, requested by Owner's Representative.

.4 Schedule shall be updated, in accordance with Construction CPM Scheduling, published by the AGC, on a monthly basis at minimum, prior to, and submitted with, the monthly pay application or as requested by the Owner's Representative.

.5 Along with the update the Contractor shall submit a narrative report addressing all changes, delays and impacts, including weather to the schedule during the last month, and explain how the end date has been impacted by same.

.6 The submission of the updated schedule certifies that all delays and impacts that have occurred on or to the project during the previous month have been factored into the update and are fully integrated into the schedule and the projected completion date.

Failure to comply with any of these requirements will be considered a material breach of this Contract. See Special Conditions for detailed scheduling requirements.

3.18. 4 In the event the Owner's Representative or the Architect determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, facilities, (3) expediting delivery of materials, and (4) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule. The Contractor shall not be entitled to an adjustment in the Contract Sum concerning Extraordinary Measures required by the Owner under or pursuant to this Paragraph. The Owner may exercise the rights furnished the Owner under or pursuant to this Paragraph as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.

ARTICLE 4
ADMINISTRATION OF THE CONTRACT

4.1 Rights of the Owner

4.1.1 The Owner's Representative will administer the Construction Contract. The Architect will assist the Owner's

Representative with the administration of the Contract as indicated in these Contract Documents.

4.1.2 If, in the judgment of the Owner's Representative, it becomes necessary to accelerate the Work, the Contractor, when directed by the Owner's Representative in writing, shall cease work at any point and transfer its workers to such point or points and execute such portions of the Work as may be required to enable others to hasten and properly engage and carry out the Work, all as directed by the Owner's Representative. The additional cost of accelerating the Work, if any, will be borne by the Owner, unless the Contractor's work progress is behind schedule as shown on the most recent progress schedule.

4.1.3 If the Contractor refuses, for any reason, to proceed with what the Owner believes to be Contract Work, the Owner may issue a Construction Directive, directing the Contractor to proceed. The Contractor shall be obligated to promptly proceed with such work. If the Contractor feels that it is entitled to additional compensation as a result of a Construction Directive, it may file a claim for additional compensation and/or time, in accordance with 4.4 of this Contract.

4.1.4 The Owner's Representative may, by written notice, require the Contractor to remove from involvement with the Work, any of the Contractor's personnel or the personnel of its Subcontractors of any tier whom the Owner's Representative may deem abusive, incompetent, careless, or a hindrance to proper and timely execution of the Work. The Contractor shall comply with such notice promptly, but without detriment to the Work or its progress.

4.1.5 The Owner's Representative will schedule Work status meetings that shall be attended by representatives of the Contractor and appropriate Subcontractors of any tier. Material suppliers shall attend status meetings if required by the Owner's Representative. These meetings shall include preconstruction meetings.

4.1.6 The Owner does not allow smoking on University property.

4.2 Rights of the Architect

4.2.1 The Architect will interpret requirements of the Contract Documents with respect to the quality, quantity, and other technical requirements of the Work itself within a reasonable time after written request of the Contractor. The Contractor shall provide Owner's Representative a copy of such written request.

4.3 Review of the Work

4.3.1 The Architect, the Owner's Representative, and the Owner's Authorized Agent shall, at all times, have access to the Work; and the Contractor shall provide proper and safe facilities for such access.

4.3.2 The Owner's Representative shall have authority to reject Work that does not strictly comply with the requirements of the Contract Documents. Whenever the Owner's Representative considers it necessary or advisable for implementation of the intent of the Contract Documents, Owner's Representative shall have the authority to require additional inspection or testing of the Work, whether or not such Work is fabricated, installed, or completed.

4.3.3 The fact that the Architect or the Owner's Representative observed, or failed to observe, faulty Work, or Work done which is not in accordance with the Contract Documents, regardless of whether or not the Owner has released final payment, shall not relieve the Contractor from responsibility for all damages and additional costs of the Owner as a result of defective or faulty Work.

4.4 Claims

4.4.1 A Claim is a demand or assertion by the Contractor seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or any other relief with respect to the terms of the Contract. The term "Claim(s)" also includes demands and assertions of the Contractor arising out of or relating to the Contract Documents, including Claims based upon breach of contract, mistake, misrepresentation, or other cause for Contract Modification or rescission. Claims must be made by written notice. The Contractor shall have the responsibility to substantiate Claims.

4.4.2 Claims by the Contractor must be made promptly, and no later than within fourteen (14) days after occurrence of the event giving rise to such Claim. Claims must be made by written notice. Such notice shall include a detailed statement setting forth all reasons for the Claim and the amount of additional money and additional time claimed by the Contractor. The notice of Claims shall also strictly comply with all other provisions of the Contract Documents. The Contractor shall not be entitled to rely upon any grounds or basis for additional money on additional time not specifically set forth in the notice of Claim. All Claims not made in the manner provided herein shall be deemed waived and of no effect. The Contractor shall furnish the Owner and the Architect such timely written notice of any Claim provided for herein, including, without limitation, those in connection with alleged concealed or unknown conditions, and shall cooperate with the Owner and the Architect in any effort to mitigate the alleged or potential damages, delay or other adverse consequences arising out of the condition which is the cause of such a Claim.

4.4.3 Pending final resolution of a Claim, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments that are not in dispute in accordance with the Contract Documents.

4.5 Claims for Concealed or Unknown Conditions

4.5.1 If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to

exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the Contractor shall be given to the Owner's Representative promptly before conditions are disturbed, and in no event later than three (3) days after first observance of the conditions. The Owner's Representative will promptly investigate such conditions. If such conditions differ materially, as provided for above and cause an increase or decrease in the Contractor's cost, or time, required for performance of the Work, an equitable adjustment in the Contract Sum or Contract Time, or both, shall be made, subject to the provisions and restrictions set for herein. If the Owner's Representative determines that the conditions at the site are not materially different from those indicated in the Contract Documents, and that no change in the terms of the Contract is justified, the Owner's Representative will so notify the Contractor in writing. If the Contractor disputes the finding of the Owner's Representative that no change in the terms of the Contract terms is justified, the Contractor shall proceed with the Work, taking whatever steps are necessary to overcome or correct such conditions so that Contractor can proceed in a timely manner. The Contractor may have the right to file a Claim in accordance with the Contract Documents.

4.5.2 It is expressly agreed that no adjustment in the Contract Time or Contract Sum shall be permitted, however, in connection with a concealed or unknown condition which does not differ materially from those conditions disclosed or which reasonably should have been disclosed by the Contractor's (1) prior inspections, tests, reviews and preconstruction investigations for the Project, or (2) inspections, tests, reviews and preconstruction inspections which the Contractor had the opportunity to make or should have performed in connection with the Project.

4.6 Claim for Additional Cost

4.6.1 If the Contractor makes a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. In addition to all other requirements for notice of a Claim, said notice shall detail and itemize the amount of all Claims and shall contain sufficient data to permit evaluation of same by the Owner.

4.7 Claims for Additional Time

4.7.1 If the Contractor makes a Claim for an increase in the Contract Time, written notice as provided herein shall be given. In addition to other requirements for notice of a Claim, the Contractor shall include an estimate of the probable effect of delay upon the progress of the Work, utilizing a CPM Time Impact Schedule Analysis, (TIA) as defined in the AGC Scheduling Manual. In the case of a continuing delay, only one Claim is necessary.

.1 Time extensions will be considered for excusable delays only. That is, delays that are beyond the control and/or contractual responsibility of the Contractor.

4.7.2 If weather days are the basis for a Claim for additional time, such Claim shall be documented by the Contractor by data acceptable to the Owner's Representative substantiating that weather conditions for the period of time in question, had an adverse effect on the critical path of the scheduled construction. Weather days shall be defined as days on which critical path work cannot proceed due to weather conditions (including but not limited to rain, snow, etc.), in excess of the number of days shown on the anticipated weather day schedule in the Special Conditions. To be considered a weather day, at least four (4) working hours must be lost due to the weather conditions on a critical path scope item for that day. Weather days and anticipated weather days listed in the Special Conditions shall only apply to Monday through Friday. A weather day claim cannot be made for Saturdays, Sundays, New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the day after Thanksgiving Day and Christmas Day, unless that specific day was approved in writing for work by the Owner's Representative.

.1 The Contractor must have fulfilled its contractual obligations with respect to temporary facilities and protection of its work, and worker protection for hot and cold weather per OSHA guidelines.

.2 If the contractual obligations have been satisfied, the Owner will review requests for non-compensable time extensions for critical path activities as follows:

.2.1 If the Contractor cannot work on a critical path activity due to adverse weather, after implementing all reasonable temporary weather protection, the Contractor will so notify the Owner's Representative. Each week, the Contractor will notify the Owner's Representative of the number of adverse weather days that it believes it has experienced in the previous week. As provided in the Contract, until such time as the weather days acknowledged by the Owner's Representative exceed the number of days of adverse weather contemplated in the Special Conditions, no request for extension of the Contract Time will be considered.

.2.2 If the Contractor has accumulated in excess of the number of adverse weather days contemplated in the Special Conditions due to the stoppage of work on critical path activities due to adverse weather, the Owner will consider a time extension request from the Contractor that is submitted in accordance with the Contract requirements. The Owner will provide a Change Order extending the time for contract completion or direct an acceleration of the Work in accordance with the Contract terms and conditions to recover the time lost due to adverse weather in excess of the number of adverse weather working days contemplated in the Special Conditions.

4.7.3 A Force Majeure event or circumstance shall not be the basis of a claim by the Contractor seeking an adjustment in the Contract amount for costs or expenses of any type. With the exception of weather delays, which are administered under Article 4, and not withstanding other requirements of the Contract, all Force Majeure events resulting in a delay to the critical path of the project shall be administered as provided in Article 8.

4.7.4 The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment.

4.8 Resolution of Claims and Disputes

4.8.1 The Owner's Representative will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1) request additional supporting data from the Contractor, (2) reject the Claim in whole or in part, (3) approve the Claim, or (4) suggest a compromise.

4.8.2 If a Claim has not been resolved, the Contractor shall, within ten (10) days after the Owner's Representative's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested, (2) modify the initial Claim, or (3) notify the Owner's Representative that the initial Claim stands.

4.8.3 If a Claim has not been resolved after consideration of the foregoing and of further information presented by the Contractor, the Contractor has the right to seek administrative review as set forth in Section 4.9. However, Owner's Representative's decisions on matters relating to aesthetics will be final.

4.9 Administrative Review

4.9.1 Claims not resolved pursuant to the procedures set forth in the Contract Documents except with respect to Owner's Representative's decision on matters relating to aesthetic effect, and except for claims which have been waived by the making or acceptance of final payment, or the Contractor's acceptance of payments in full for changes in work may be submitted to administrative review as provided in this Section. All requests for administrative review shall be made in writing.

4.9.2 Upon written request from the Contractor, the Owner's Review Administrator authorized by the Campus Contracting Officer will convene a review meeting between the Contractor and Owner's Representative within fifteen (15) days of receipt of such written request. The Contractor and Owner's Representative will be allowed to present written documentation with respect to the Claim(s) before or during the meeting. The Contractor and Owner's Representative will be allowed to present the testimony of any knowledgeable person regarding the Claim at the review meeting. The Owner's Review Administrator will issue a written summary of the review meeting and decision to resolve the Claim within fifteen (15) days. If the Contractor is in agreement with the decision the Contractor shall notify the Owner's Review Administrator in writing within five (5) days, and appropriate documentation will be signed by the parties to resolve the Claim.

4.9.3 If the Contractor is not in agreement with the proposal of the Owner's Review Administrator as to the resolution of the Claim, the Contractor may file a written appeal with the UM System Contracting Officer, [in care of the Executive Director of Facilities Planning and Development, University of Missouri, 130 General Services Building, University of Missouri, Columbia, Missouri 65211] within fifteen (15) days after receipt of the Owner's Review Administrator's proposal. The UM System Contracting Officer will call a meeting of the Contractor, the Owner's Representative, and the Owner's Review Administrator by written notice, within thirty (30) days after receipt of the Contractor's written appeal. The Owner's Review Administrator shall provide the UM System Contracting Officer with a copy of the written decision and summary of the review meeting, the Contractor's corrections, or comments regarding the summary of the review meeting, and any written documentation presented by the Contractor and the Owner's Representative at the initial review meeting. The parties may present further documentation and/or present the testimony of any knowledgeable person regarding the Claim at the meeting called by the UM System Contracting Officer.

4.9.4 The UM System Contracting Officer will issue a written decision to resolve the claim within fifteen (15) days after the meeting. If the Contractor is in agreement with the UM System Contracting Officer's proposal, the Contractor shall notify the UM System Contracting Officer in writing within five (5) days, and the Contractor and the Owner shall sign appropriate documents. The issuance of the UM System Contracting Officer's written proposal shall conclude the administrative review process even if the Contractor is not in agreement. However, proposals and any opinions expressed in such proposals issued under this Section will not be binding on the Contractor nor will the decisions or any opinions expressed be admissible in any legal actions arising from the Claim and will not be deemed to remove any right or remedy of the Contractor as may otherwise exist by virtue of Contract Documents or Law. The Contractor and the Owner agree that the Missouri Circuit Court for the County where the Work is located shall have exclusive jurisdiction to determine all issues between them. The Contractor agrees not to file any complaint, petition, lawsuit or legal proceeding against the Owner except with such Missouri Circuit Court.

ARTICLE 5
SUBCONTRACTORS

5.1 Award of Subcontracts

5.1.1 Pursuant to Article 9, the Contractor shall furnish the Owner and the Architect, in writing, with the name, and trade for each Subcontractor and the names of all persons or entities proposed as manufacturers of products, materials and equipment identified in the Contract Documents and where applicable, the name of the installing contractor. The Owner's Representative will reply to the Contractor in writing if the Owner has reasonable objection to any such proposed person or entity. The Contractor shall not contract with a proposed person or entity to whom the Owner has made reasonable and timely objection.

5.1.2 The Contractor may request to change a Subcontractor. Any such request shall be made in writing to the Owner's Representative. The Contractor shall not change a Subcontractor, person, or entity previously disclosed if the Owner makes reasonable objection to such change.

5.1.3 The Contractor shall be responsible to the Owner for acts, defaults, and omissions of its Subcontractors of any tier.

5.2 Subcontractual Relations

5.2.1 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor of any tier, to the extent of the Work to be performed by the Subcontractor of any tier, to be bound to the Contractor by terms of the Contract Documents and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and the Architect. Each subcontract agreement of any tier shall preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor of any tier so that subcontracting thereof will not prejudice such rights and shall allow to the Subcontractor of any tier, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with its sub-subcontractors. The Contractor shall make available to each proposed Subcontractor of any tier, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor of any tier shall be bound Subcontractors of any tier shall similarly make copies of applicable portions of such documents available to their respective proposed Subcontractors of any tier.

5.2.2 All agreements between the Contractor and a Subcontractor or supplier shall contain provisions whereby Subcontractor or supplier waives all rights against the Owner, Contractor, Owner's Representative, the Architect and all other Additional Insureds for all losses and damages caused by, arising out of, or resulting from any of the perils covered by property or builders risk insurance coverage required of the Contractor in the Contract Documents. If Contractor fails to include said provisions in all subcontracts, Contractor shall indemnify, defend and hold all the above entities harmless in the event of any legal action by Subcontractor or supplier. If insureds on any such policies require separate waiver forms to be signed by any Subcontractors of any tier or suppliers, Contractor shall obtain the same.

5.3 Contingent Assignment of Subcontract

5.3.1 No assignment by the Contractor of any amount or any part of the Contract or of the funds to be received thereunder will be recognized unless such assignment has had the written approval of the Owner, and the surety has been given due notice of such assignment and has furnished written consent hereto. In addition to the usual recitals in assignment Contracts, the following language must be set forth: "It is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor of the Contract and to claims and to liens for services rendered or materials supplied for the performance of the Work called for in said Contract in favor of all persons, firms or corporations rendering such services or supplying such materials."

ARTICLE 6
SEPARATE CONTRACTS AND COOPERATION

6.1 The Owner reserves the right to let other contracts in connection with the Work.

6.2 It shall be the duty of each Contractor to whom Work may be awarded, as well as all Subcontractors of any tier employed by them, to communicate immediately with each other in order to schedule Work, locate storage facilities, etc., in a manner that will permit all Contractors to work in harmony in order that Work may be completed in the manner and within the time specified in the Contract Documents.

6.3 No Contractor shall delay another Contractor by neglecting to perform the Contractor's work at the proper time. Each Contractor shall be required to coordinate the Contractor's work with other Contractors to afford others reasonable opportunity for execution of their work. Any costs caused by defective, non-compliant, or ill-timed work, including actual damages and liquidated damages for delay, if applicable, shall be borne by the Contractor responsible therefor.

6.4 Each Contractor shall be responsible for damage to the Owner's or another Contractor's property done by the Contractor or the Contractor's employees, through his or their fault or negligence. If any Contractor shall cause damage to any other Contractor, the Contractor causing such damage shall upon notice of any claim, settle with such Contractor.

6.5 The Contractor shall not claim from the Owner money damages or extra compensation under this Contract when delayed in initiating or completing his performance hereunder, when the delay is caused by labor disputes, acts of God, or the failure of any other Contractor to complete the Contractor's performance under any Contract with the Owner, where any such cause is beyond the Owner's reasonable control.

6.6 Progress schedule of the Contractor for the Work shall be submitted to other Contractors as necessary to permit coordinating their progress schedules.

6.7 If Contractors or Subcontractors of any tier refuse to cooperate with the instructions and reasonable requests of other contractors performing work for the Owner under separate contract, in the overall coordinating of the Work, the

Owner's Representative may take such appropriate action and issue such instructions as in his judgement may be required to avoid unnecessary and unwarranted delay.

ARTICLE 7
CHANGES IN THE WORK

7.1 CHANGE ORDERS

7.1.1 A Change Order is a written instrument prepared by the Owner and signed by the Owner and the Contractor formalizing their agreement on the following:

.1 a change in the Work

.2 the amount of an adjustment, if any, in the Contract amount

.3 an adjustment, if any, in the Contract Time

7.1.2 The Owner may at any time, order additions, deletions, or revisions in the Work by a Change Order or a Construction Change Directive. Such Change Order or Construction Change Directive shall not invalidate the Contract and requires no notice to the surety. Upon receipt of any such document, or written authorization from the Owner's Representative directing the Contractor to proceed pending receipt of the document, the Contractor shall promptly proceed with the Work involved in accordance with the terms set forth therein.

7.1.3 Until such time as the Change Order is formalized and signed by both the Owner and the Contractor it shall be considered a Change Order Request.

7.1.4 The amount of adjustment in the Contract price for authorized Change Orders will be agreed upon before such Change Orders becomes effective and will be determined as follows:

.1 By a lump sum proposal from the Contractor and the Subcontractors of any tier, including overhead and profit.

.2 By a time and material basis with or without a specified maximum. The Contractor shall submit to the Owner's Representative itemized time and material sheets depicting labor, materials, equipment utilized in completing the Work on a daily basis for the Owner's Representative approval. If this pricing option is utilized, the Contractor may be required to submit weekly reports summarizing costs to date on time and material Change Order Requests not yet finalized.

.3 By unit prices contained in the Contractor's original bid and incorporated in the Construction Contract or subsequently agreed upon. Such unit prices contained in the Contractor's original proposal are understood to include the Contractor's overhead and profit. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order that application of such unit prices to quantities of the Work proposed will cause substantial inequity to the Owner or to the Contractor, the applicable unit prices shall be equitably adjusted.

7.1.5 The Contractor shall submit all fully documented Change Order Requests with corresponding back-up documentation within the time requested by the Owner but no later than fourteen (14) working days following 1.) the Owner's request for pricing in the case of a lump sum; or 2.) the completion of unit price or time and material work.

7.1.6 The Contractor shall submit Change Order Requests in sufficient detail to allow evaluation by the Owner. Such requests shall be fully itemized by units of labor, material and equipment and overhead and profit. Such breakdowns shall be itemized as follows:

.1 Labor: The Contractor's proposal shall include breakdowns by labor, by trade, indicating number of hours and cost per hour for each Subcontractor as applicable. Such breakdowns shall only include employees in the direct employ of the Contractor or Subcontractors in the performance of the Work. Such employees shall only include laborers at the site, mechanics, craftsmen and foremen. Payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor or Subcontractors. Any item or expense outside of these categories is not allowed. The expense of performing Work after regular working hours, on Saturdays, Sundays or legal holidays shall not be included in the above, unless approved in writing and in advance by Owner.

.2 Material, supplies, consumables and equipment to be incorporated into the Work at actual invoice cost to the Contractor or Subcontractors; breakdowns showing all material, installed equipment and consumables fully itemized with number of units installed and cost per unit extended. Any singular item or items in aggregate greater than one thousand dollars ($1,000) in cost shall be supported with supplier invoices at the request of the Owner's Representative. Normal hand tools are not compensable.

.3 Equipment: Breakdown for required equipment shall itemize (at a minimum) delivery / pick-up charge, hourly rate and hours used. Operator hours and rate shall not be included in the equipment breakdown. Contractor must use the most cost-effective equipment available in the area and should not exceed the rates listed in the Rental Rate Blue Book for Construction Equipment (Blue Book). The Contractor shall submit documentation for the Blue Book to support the rate being requested.

7.2 Construction Change Directive

7.2.1 A construction change directive is a written order prepared and signed by the Owner, issued with supporting documents prepared by the Architect (if applicable), directing a change in the Work prior to agreement on adjustment of the Contract amount or Contract Time, or both. A Construction

Change Directive shall be used in the absence of complete agreement between the Owner and Contractor on the terms of a Change Order. If the Construction Change Directive allows an adjustment of the Contract amount or time, such adjustment amount shall be based on one of the following methods:

.1 A lump sum agreement, properly itemized and supported by substantiating documents of sufficient detail to allow evaluation.

.2 By unit prices contained in the Contractor's original proposal and incorporated in the Construction Contract or subsequently agreed upon.

.3 A method agreed to by both the Owner and the Contractor with a mutually agreeable fee for overhead and profit.

.4 In the absence of an agreement between the Owner and the Contractor on the method of establishing an adjustment of the Contract amount, the Owner, with the assistance of the Architect, shall determine the adjustment amount on the basis of expenditures by the Contractor for labor, materials, equipment, and other costs consistent with other provisions of the Contract. The Contractor shall keep and submit to the Owner an itemized accounting of all cost components, either expended or saved, while performing the Work covered under the Construction Change Directive.

7.2.2 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Owner of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum, Contract Time, or both.

7.2.3 A Construction Change Directive signed by Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3 Overhead and Profit

7.3.1 Overhead and Profit on Change Orders shall be applied as follows:

.1 The overhead and profit charged by the Contractor and Subcontractors shall be considered to include, but not limited to, job site office and clerical expense, normal hand tools, incidental job supervision, field supervision, payroll costs and other compensation for project manager, officers, executives, principals, general managers, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, time-keepers, and other personnel employed whether at the site or in principal or a branch office for general superintendent and administration of the Work.

.2 The percentages for overhead and profit charged on Change Orders shall be negotiated and may vary according to the nature, extent, and complexity of the Work involved but in no case shall exceed the following:

15% To the Contractor or the Subcontractor of any tier for Work performed with their respective forces or materials purchased

5% To the Contractor on Work performed by other than the Contractor's forces

5% To first tier Subcontractor on Work performed by his Subcontractor

.3

, extent, and complexity of The Contractor will be allowed to add 2% for the cost of bonding and insurance to their cost of work. This 2% shall be allowed on the total cost of the added work, including overhead and profit.

.4 Not more than three mark-ups, not to exceed individual maximums shown above, shall be allowed regardless of the number of tier Subcontractors. Overhead and profit shall be shown separately for each Subcontractor of any tier and the Contractor.

.5 On proposals covering both increases and decreases in the amount of the Contract, the application of overhead and profit shall be on the net change in direct cost for the Contractor or Subcontractor of any tier performing the Work.

.6 The percentages for overhead and profit credit to the Owner on Change Orders that are strictly decreases in the quantity of work or materials shall be negotiated and may vary according to the naturethe Work involved, but shall not be less than the following:

Overhead and Profit

7.5% Credit to the Owner from the Contractor or Subcontractor of any tier for Work performed with their respective forces or materials purchased

2.5% Credit to the Owner from the Contractor on Work performed by other than his forces

2.5% Credit to the Owner from the first tier Subcontractor on Work performed by his Subcontractor of any tier

7.4 Extended General Conditions

7.4.1 The Contractor acknowledges that the percentage mark-up allowed on Change Orders for overhead and profit cover the Contractor's cost of administering and executing the Work, inclusive of Change Orders that increase the Contract Time. The Contractor further acknowledges that no compensation beyond the specified mark-up percentages for extended overhead shall be due or payable as a result of an increase in the Contract Time.

7.4.2 The Owner may reimburse the Contractor for extended overhead if an extension of the Contract Time is granted by the Owner, in accordance with 4.7.1 and the Owner determines that the extension of the Contract Time creates an inequitable condition for the Contractor. If these conditions are determined by the Owner to exist, the Contractor may be reimbursed by unit prices contained in the Contractor's original bid and incorporated in the Construction Contract or by unit prices subsequently agreed upon.

7.4.3 If unit prices are subsequently agreed upon, the Contractor's compensation shall be limited as follows:

.1 For the portion of the direct payroll cost of the Contractor's project manager expended in completing the Work and the direct payroll cost of other onsite administrative staff not included in Article 7.3.1. Direct payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor;

.2 Cost of the Contractor's temporary office, including temporary office utilities expense;

.3 Cost of temporary utilities required in the performance of the Work;

.4 Profit not to exceed 5% of the total extended overhead direct costs;

7.4.4 All costs not falling into one of these categories and costs of the Contractor's staff not employed onsite are not allowed.

7.5 Emergency Work

7.5.1 If, during the course of the Work, the Owner has need to engage the Contractor in emergency work, whether related to the Work or not, the Contractor shall immediately proceed with the emergency work as directed by the Owner under the applicable provisions of the Contract. In so doing, the Contractor agrees that all provisions of the Contract remain in full force and effect and the schedule for the Work is not impacted in any way unless explicitly agreed to in writing by the Owner.

ARTICLE 8
TIME

8.1 Progress and Completion

8.1.1 The Contractor acknowledges and agrees that time is of the essence of this Contract.

8.1.2 The Contract Time is the period of time set forth in the Contract for Construction required for Substantial Completion and Final Completion of the entire Work or portions of the Work as defined in the Contract Documents. Time limits stated in the Contract Documents are of the essence of the Contract. The Contract Time may only be changed by a Change Order. By executing the Contract, the Contractor confirms that the Contract Time is a sufficient period for performing the Work in its entirety.

8.1.3 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance and bonds required by Article 11 to be furnished by the Contractor.

8.1.4 The Contractor shall proceed expeditiously and diligently with adequate forces and shall achieve Substantial Completion and Final Completion within the time specified in the Contract Documents.

8.2 Delay in Completion

8.2.1 The Contractor shall be liable for all of the Owner's damages for delay in achieving Substantial Completion and/or Final Completion of the entire Work or portions of Work as set forth in the Contract Documents within the Contract Time unless liquidated damages are specifically provided for in the Contract Documents. If liquidated damages are specifically provided for in the Contract for Construction, the Contractor shall be liable for such liquidated damages as set forth in Section 8.3

8.2.2 All time limits stated in the Contract are of the essence of the Contract. However, if the Contractor is delayed at any time in the progress of the Work by any act or neglect of the Owner or by the Owner's Representative, by changes ordered in the Work, Force Majeure including but not limited to war, armed conflict, riot, civil commotion or disorder, act of terrorism or sabotage; epidemic, pandemic, outbreaks of infectious disease or any other public health crisis, including quarantine or other employee restrictions, compliance with any law or governmental order, rule, regulation or direction, curfew restriction, act of God or natural disaster such as earthquake, volcanic activity, landslide, tidal wave, tsunami, flood, damage or destruction by lightning, drought; explosion, fire, destruction of machines, equipment, prolonged break-down of transport, telecommunication or electric current; general labor disturbance such as but not limited to boycott, strike and lock-out, occupation of factories and premises, or any other causes beyond the Contractor's reasonable control which the Owner's Representative determines may justify delay then, upon submission of the Time Impact Schedule Analysis (TIA) justifying the delay called out in Section 4.7 of these General Conditions, the Contract Time may be extended for a reasonable time to the extent such delay will prevent the Contractor from achieving Substantial Completion and/or Final Completion within the Contract Time and if performance of the Work is not, was not or would not have been delayed by any other cause for which the Contractor is not entitled to an extension of the Contract Time under the Contract Documents. It shall be a condition precedent to any adjustment of the Contract Time that the Contractor provides the Owner's Representative with written notice of the cause of delay within seven (7) days from the occurrence of the event or condition which caused the claimed delay. If a Force Majeure is approved by the Owner as the basis for a delay claim, an adjustment in the Contract Time to the extent the Force Majeure impacts the schedule is the only remedy. No increase in the Contract Sum for any reason shall be allowed due to a Force Majeure.

8.2.3 The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (1) is not caused, or could not have been anticipated, by the Contractor, (2) could not be limited or

avoided by the Contractor's timely notice to the Owner of the delay, (3) prevents the Contractor from completing its Work by the Contract Time, and (4) is of a duration not less than one (1) day. Delays attributable to and within the control of a Subcontractor or supplier shall not justify an extension of the Contract Time.

8.2.4 Notwithstanding anything to the contrary in the Contract Documents, except as otherwise noted in these General Conditions, an extension in the Contract Time, to the extent permitted under this Article, shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other claims due to or caused by any events beyond the control of both the Owner and the Contractor defined herein as Force Majeure. In no event shall the Contractor be entitled to any compensation or recovery of any damages or any portion of damages resulting from delays caused by or within the control of the Contractor or by acts or omissions of the Contractor or its Subcontractors of any tier or delays beyond the control of both the Owner and the Contractor. If the Contractor contends that delay, hindrance, obstruction or other adverse condition results from acts or omissions of the Owner, the Owner's Representative or the Architect, the Contractor shall provide written notice to the Owner within seven (7) calendar days of the event giving rise to such claim. The Contractor shall only be entitled to an adjustment in the Contract Sum to the extent that such acts or omissions continue after the Contractor's written notice to the Owner of such acts or omissions, but in no case shall Force Majeure be the basis of an increase in the Contract Sum. The Owner's exercise of any of its rights or remedies under the Contract Documents (including, without limitation, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work) regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be the basis of any Claim for an increase in the Contract Sum or Contract Time. In the event Contractor is entitled to an adjustment in the Contract Sum for any delay, hindrance, obstruction or other adverse condition caused by the acts or omissions of the Owner, the Owner's Representative or the Architect, the Contractor shall only be entitled to its actual direct costs caused thereby and the Contractor shall not be entitled to and waives any right to special, indirect, or consequential damages including loss of profits, loss of savings or revenues, loss of anticipated profits, labor inefficiencies, idle equipment, home office overhead, and similar type of damages.

8.2.5 If the Contractor submits a progress report or any construction schedule indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied. Further, the Contractor acknowledges and agrees that even if the Contractor intends or is able to complete the Work prior to the Contract Time, it shall assert no Claim and the Owner shall not be liable to the Contractor for any failure of the Contractor, regardless of the cause of the failure, to complete the Work prior to the Contract Time.

8.3 Liquidated Damages

8.3.1 If Liquidated Damages are prescribed on the Bid Form and Special Conditions in the Contract Documents, the Owner may deduct from the Contract Sum and retain as Liquidated Damages, and not as penalty or forfeiture, the sum stipulated in the Contract Documents for each calendar day after the date specified for completion of the Work that the entire Work is not substantially complete and/or finally complete.

8.3.2 The Owner's Representative shall establish the date of Substantial Completion and the date of Final Completion of the Work which shall be conclusive and binding on the Owner and the Contractor for the purpose of determining whether or not Liquidated Damages shall be assessed under terms hereof and the sum total amount due.

8.3.3 Liquidated Damages or any matter related thereto shall not relieve the Contractor or the Contractor's surety of any responsibility or obligation under this Contract.

ARTICLE 9
PAYMENTS AND COMPLETION

9.1 Commencement, Prosecution, and Completion

9.1.1 The Contractor shall commence Work within five (5) days upon the date of a "Notice to Proceed" from the Owner or the date fixed in the Notice to Proceed. The Contractor shall prosecute the Work with faithfulness and diligence, and the Contractor shall complete the Work within the Contract Time set forth in the Contract Documents.

9.1.2 The Owner will prepare and forward three (3) copies of the Contract and Performance Bond to the bidder to whom the Contract for the Work is awarded and such bidder shall return two (2) properly executed prescribed copies of the Contract and Bond to the Owner.

9.1.3 The construction period, when specified in consecutive calendar days, shall begin when the Contractor receives notice requesting the instruments listed in below. Before the Owner will issue Notice to Proceed to permit the Contractor to begin Work, the Owner shall have received the following instruments, properly executed as described in the Contract Documents. The documents below shall have been received by the Owner within fifteen (15) days after receipt of request for documents:

.1 Contract
.2 Bond (See Article 11)
.3 Insurance (See Article 11)
.4 List of Subcontractors of any tier

9.1.4 In the event the Contractor fails to provide the Owner such documents, the Contractor may not enter upon the site of the Work until such documents are provided. The date the

Contractor is required to commence and complete the Work shall not be affected by the Owner denying the Contractor access to the site as a result of the Contractor's failure to provide such documents and the Contractor shall not be entitled to an adjustment of the Contract Time or Contract Sum as a result of its failure to provide the Owner the required documents

9.1.5 Contracts executed by partnerships shall be signed by all general partners of the partnership. Contracts signed by corporations shall be signed by the President or Vice President and the Secretary or Assistant Secretary. In case the Assistant Secretary or Vice President signs, it shall be so indicated by writing the word "Asst." or "Vice" in front of the words "Secretary" and "President". The corporate seal of the corporation shall be affixed. For all other types of entities, the Contractor and the person signing the Contract on behalf of the Contractor represent and warrant that the person signing the Contract has the legal authority to bind the Contractor to the Contract.

9.1.6 Any successful bidder which is a corporation organized in a state other than Missouri or any bidder doing business in the State of Missouri under a fictitious name shall furnish, at no cost to the Owner, no later than the time at which the executed Contract for Construction, the Payment Bond, and the Performance Bond are returned, a properly certified copy of its current Certificate of Authority and License to do business in the State of Missouri. No contract will be executed by the Owner until such certificate is furnished by the bidder, unless there already is on file with the Owner a current certificate, in which event, no additional certificate will be required during the period of time for which such current certificate remains in effect.

9.1.7 Within fifteen (15) calendar days of the issuance of a Notice to Proceed, the Contractor shall submit one (1) signed copy of the following instruments. No payment will be processed until all of these instruments are received and approved by the Owner's Representative.

.1 Reproducible progress and payment schedule

.2 Contractor's Schedule of Values

.3 List of material suppliers

.4 Itemized breakdown of all labor rates for each classification. Overhead and profit shall not be included. Payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor or Subcontractors. Any item or expense outside of these categories is not allowed. The expense of performing Work after regular working hours, on Saturdays, Sundays or legal holidays shall not be included in the above, unless approved in writing and in advance by the Owner.

.5 Itemized breakdown of anticipated equipment rates (breakout operator rate). Overhead and profit shall not be included. Breakdown for required equipment shall itemize (at a minimum) delivery/ pick-up charge, hourly rate and hours used. Operator hours and rate shall not be included in the equipment breakdown. The Contractor must use the most cost-effective equipment available in the area and should not exceed the rates listed in the Rental Rate Blue Book for Construction Equipment (Blue Book). The Contractor shall submit documentation for the Blue Book to support the rate being requested.

9.1.8 The Contractor shall be paid electronically using the Owner's web-based payment program with a direct electronic transfer from the Owner's account into the Contractor's account. The Contractor must submit the following information to the Owner's Representative:

.1 Bank Transit Number for the Contractor's bank into which the electronic deposit will be made.

.2 Bank Account Number for the Contractor's account into which the electronic deposit will be made.

.3 Contractor's E-Mail address so that formal notification of the deposit by the Owner can be provided.

9.2 Contract Sum

9.2.1 The Owner shall compensate the Contractor for all Work described herein, and in the Contract Documents the Contract Sum set forth in the Contract for Construction, subject to additions and deletions as provided hereunder.

9.3 Schedule of Values

9.3.1 Within fifteen (15) days after receipt of the Notice to Proceed, the Contractor shall submit to the Owner's Representative a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Owner's Representative may require. This schedule, unless objected to by the Owner's Representative, shall be used as a basis for reviewing the Contractor's Applications for Payment. The values set forth in such schedule may, at the Owner's option be used in any manner as fixing a basis for additions to or deletions from the Contract Sum.

9.3.2 The progress and payment schedule of values shall show the following:

.1 Enough detail as necessary to adequately evaluate the actual percent complete of any line item on a monthly basis, as determined by the Owner's Representative.

.2 Line items, when being performed by a Subcontractor or material supplier, shall correlate directly back to the subcontract or purchase order amount if requested by the Owner's Representative.

9.4 Applications for Payment

9.4.1 The Contractor shall submit monthly to the Owner's Representative and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be supported by such data substantiating the Contractor's right to payment as the Owner's Representative or the Architect may require, such as

copies of requisitions from Subcontractors and material suppliers, and reflecting retainage as provided for herein.

9.4.2 Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier

9.4.3 Progress payments shall be made on account of materials and equipment delivered to the site and incorporated in the Work. No payments will be made for materials and equipment stored at the Project site but not yet incorporated into the Work except as provided in Paragraph 9.4.4.

9.4.4 If approved in writing and in advance by the Owner, progress payments may be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. The Owner may in its sole discretion refuse to grant approval for payments for materials and equipment stored at the Project site but not yet incorporated in the Work. Any approval by the Owner for payment for materials and equipment delivered and suitably stored at the site, or stored offsite as noted below, for subsequent incorporation in the Work shall be conditioned upon Contractor's demonstrating that such materials and equipment are adequately protected from weather, damage, vandalism and theft and that such materials and equipment have been inventoried and stored in accordance with procedures established by or approved by the Owner. Nothing in this clause shall imply or create any liability on the part of the Owner for the Contractor's inventory and storage procedures or for any loss or damage to material, equipment or supplies stored on the site, whether incorporated into the Work or not. In the event any such loss or damage occurs, the Contractor remains solely responsible for all costs associated with replacement of the affected materials, supplies and equipment including labor and incidental costs, and shall have no claim against the Owner for such loss.

No allowance shall be made in the project pay requests for materials not delivered to the site of the Work and incorporated into the Work, except as noted below. For the purposes of this Contract, offsite is defined as any location not owned or leased by the Owner. The Contractor shall submit a list of materials that they are requesting payment for offsite storage within sixty (60) days of Notice to Proceed.

.1 Items considered to be major items of considerable magnitude, if suitably stored, may be allowed in project pay requests on the basis of ninety percent (90%) of invoices

.2 Determination of acceptable "major items of considerable magnitude" and "suitably stored" shall be made by the Owner's Representative.

.3 Aggregate quantities of materials not considered unique to this project will not be considered for offsite storage payment.

.4 The Contractor shall submit to the Owner's Representative a list of the material for which application for payment for offsite storage is anticipated no less than forty-five days (45) prior to the submission of the applicable pay request. The list shall include a material description, applicable division, quantity, and discounts offered to the Owner for early payment. The Contractor shall also submit the location the material will be stored and the method of protection

.5 The storage facility shall be subject to approval by the Owner's representative, shall be located within an acceptable distance of the project sites as established by the Owner's Representative and all materials for the Owner's project must be stored separately from all other items within the storage facility and shall be labeled and stored in the name of "The Curators of the University of Missouri."

.6 The Owner's Representative shall be provided a minimum of two weeks' notice to visit the storage facility and inspect the stored material prior to submission of the pay request.

.7 Upon favorable inspection by the Owner's Representative, the Contractor shall, at the Owner's option, submit a Bill of Sale on forms provided by the Owner's Representative, transferring title of the material or equipment to "The Curators of the University of Missouri."

.8 An invoice provided by the supplier shall be included with the applicable pay request.

.9 The Contractor shall remain fully responsible for all items, until acceptance of the project by the Owner.

.10 The Contractor shall reimburse all costs incurred by the Owner in inspecting and verifying all material stored offsite, including mileage, airfare, meals, lodging and time, charged at a reasonable hourly rate.

.11 The Contractor shall furnish and maintain insurance covering the replacement cost of the material stored offsite against all losses and shall furnish proof of coverage with the application for payment for material stored offsite.

.12 The Contractor is responsible for all costs related to storage and handling of material stored offsite unless otherwise directed by the Owner's Representative.

9.4.5 The Application for Payment shall constitute a representation by the Contractor to the Owner that the Work has progressed to the point indicated; the quality of the Work covered by the Application for Payment is in accordance with the Contract Documents; and the Contractor is entitled to payment in the amount requested.

9.4.6 The Contractor will be reimbursed for ninety-five percent (95%) of the value of all labor furnished and material installed and computed in the same manner, less all previous payments made. On projects where a bond is not required, the Contractor will be reimbursed for ninety percent (90%) of the value of all labor furnished and material installed and computed in the same manner, less all previous payments made. The Owner shall hold the remaining five (5) or ten (10) percent, as applicable, as retainage until Substantial Completion of the work as set forth in 9.9.3 below.

9.5 Approval for Payment

9.5.1 The Owner's Representative will, within fifteen (15) days after receipt of the Contractor's Application for Payment, either approve Contractor's Application for Payment for such amount as the Owner's Representative determines is properly due or notify the Contractor of the Owner's Representative's reasons for withholding certification in whole or in part as provided in Section 9.6.

9.6 Decisions to Withhold Approval

9.6.1 The Owner's Representative may decide not to certify payment and may withhold approval in whole or in part, to the extent reasonably necessary to protect the Owner. If the Owner's Representative is unable to approve payment in the amount of the Application, the Owner's Representative will notify the Contractor as provided in Paragraph 9.5.1. If the Contractor and Owner's Representative cannot agree on a revised amount, the Owner's Representative will promptly issue approval for payment for the amount for which the Owner's Representative is able to determine is due to the Contractor. The Owner's Representative may also decide not to approve payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of approval for payment previously issued, to such extent as may be necessary in the Owner's Representative opinion to protect the Owner from loss because of:

.1 defective or non-compliant Work not remedied, or damage to completed Work;

.2 failure to supply sufficient skilled workers or suitable materials;

.3 third party claims filed or reasonable evidence indicating probable filing of such claims;

.4 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment, the Owner may, at its sole option issue joint checks to Subcontractors who have presented evidence that it has not been paid in accordance with the Contract;

.5 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.6 damage to the Owner or another contractor;

.7 reasonable evidence that the Work will not be completed within the Contract Time or an unsatisfactory rate of progress made by the Contractor;

.8 The Contractor's failure to comply with applicable laws;

.9 The Contractor's or Subcontractor's failure to comply with applicable wage requirements; or

.10 The Contractor's failure to carry out the Work in strict accordance with the Contract Documents.

9.6.2 When the above reasons for withholding approval are removed, approval will be made for amounts previously withheld.

9.7 Progress Payments

9.7.1 Based upon Applications for Payment submitted to the Owner by the Contractor and approvals issued by the Owner's Representative, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

9.7.2 The period covered by each Application for Payment shall be one (1) calendar month.

9.7.3 The Owner shall make payment to the Contractor for amounts due and approved by the Owner's Representative not later than thirty (30) days after the Owner approves a properly detailed Application for Payment which is in compliance with the Contract Documents. The Owner shall not have the obligation to process or pay such Application for Payment until it receives an Application for Payment satisfying such requirements.

9.7.4 Based on the Schedule of Values submitted by the Contractor, Applications for Payment submitted by the Contractor shall indicate the actual percentage of completion of each portion of the Contractor's Work as of the end of the period covered by the Application for Payment.

9.7.5 Within fifteen (15) days following receipt payment from the Owner, the Contractor shall pay each Subcontractor and supplier out of the amount paid to the Contractor on account of such Subcontractor's or supplier's portion of the Work, the amount to which said Subcontractor or supplier is entitled, reflecting percentages actually retained from payments to the Contractor on account of each Subcontractor's or supplier's portion of the Work, in full compliance with state statute. The Contractor shall, by appropriate agreement with each Subcontractor or supplier, require each Subcontractor or supplier to make payments to Sub-subcontractors in similar manner. If the Owner, the architect or engineer of record, and the Contractor all determine that a particular Subcontractor's portion of the Work has been satisfactorily completed, including corrective work and closeout requirements, payment equal to one hundred percent (100%) of the subcontract amount for that Subcontractor can be made to the Contractor prior to Substantial Completion. The Contractor shall request such adjustment as necessary to enable the Contractor to pay the Subcontractor in full. This does not relieve the Contractor of any responsibilities under the terms of the Contract and any deficiencies subsequently discovered shall be corrected at no cost to the Owner.

9.7.6 Neither the Owner nor the Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor of any tier nor a laborer or employee of the Contractor except to the extent required by law. Retainage provided for by the Contract Documents are to be retained and held for the sole protection of the Owner, and no other person, firm or corporation shall have any claim or right whatsoever thereto.

9.7.7 An approval for payment by the Owner's Representative, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

9.8 Failure of Payment

9.8.1 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment by the Contractor shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to: (1) deduct an amount equal to that to which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that to which the Owner is entitled.

9.9 Substantial Completion

9.9.1 Substantial Completion is the stage in the progress of the Work as defined in Paragraph 1.1.14 as certified by the Owner.

9.9.2 When the Contractor considers the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Owner and the Architect. The Owner's Representative will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Owner's Representative's inspection discloses any item which is not in accordance with the requirements of the Contract Documents, the Contractor shall complete or correct such item upon notification by the Owner's Representative. If the Owner's Representative determines the work is not substantially completed and accepted, then the Owner or the Owner's Representative shall provide a written explanation of why the work is not considered substantially completed and accepted within fourteen calendar days to the Contractor, who shall then provide such notice to the subcontractor or suppliers responsible for such work. The Contractor shall then submit a request for another inspection by the Owner's Representative to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Owner will issue a Certificate of Substantial Completion. Substantial Completion shall transfer from the Contractor to the Owner responsibilities for security, maintenance, heat, utilities, damage to the Work and insurance. In no event shall the Contractor have more than thirty (30) days to complete all items on the Punch List and achieve Final Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion or as agreed otherwise.

9.9.3 At the date of Substantial Completion, the Contractor may apply for, and if approved by Owner's Representative, the Owner, subject to the provisions herein, shall release the retainage, increasing the total payments to one hundred percent (100%) of the Contract Sum less one hundred fifty percent (150%) of the value of any incomplete Work and unsettled claims, as determined by the Owner's Representative.

9.10 Partial Occupancy or Use

9.10.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and the Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, security, maintenance, heat, utilities, damage to the Work and insurance. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by the Owner's Representative.

9.10.2 Immediately before such partial occupancy or use, the Owner, and the Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

9.11 Final Completion and Final Payment

9.11.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner's Representative and the Architect will promptly make such inspection and, when the Owner's Representative and the Architect find the Work acceptable under the Contract Documents and the Contract fully performed, the Owner's Representative will promptly issue a final approval for payment; otherwise, the Owner's Representative will return the Contractor's Final Application for Payment to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Submission of a Final Application for Payment shall constitute a further representation that conditions listed in Paragraph 9.11.2 as precedent to the Contractor being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Owner's Representative as part of the final Application for Payment. The final approval for payment will not be issued by the Owner's Representative until all warranties and guarantees have been received and accepted by the Owner.

9.11.2 The Owner will request the Contractor to submit the application for final payment along with a manually signed notarized letter on the Contractor's letterhead certifying that:

.1 Labor costs, prevailing wage rates, fringe benefits and material costs have been paid.

.2 Subcontractors of any tier and manufacturers furnishing materials and labor for the project have fully completed their Work and have been paid in full.

.3 The project has been fully completed in accordance with the Contract Documents as modified by Change Orders.

.4 The acceptance by the Contractor of its final payment, by check or electronic transfer, shall be and operate as a

release of all claims of the Contractor against the Owner for all things done or furnished or relating to the Work and for every act or alleged neglect of the Owner arising out of the Work.

9.11.3 Final payment constituting the entire unpaid balance due shall be paid by the Owner to the Contractor within thirty (30) days after the Owner's receipt of Contractor's Final Application for Payment which satisfies all the requirements of the Contract Documents and the Owner's receipt of all information and documents set forth in Section 9.11.

9.11.4 No payment under this Contract, including but not limited to final payment, shall constitute acceptance by the Owner of any Work or act not in accordance with the requirements of the Contract Documents.

9.11.5 No recourse shall be had against any member of the Board of Curators, or officer thereof, for any payment under the Contract or any claim based thereon.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

10.1 Safety Precautions and Programs

10.1.1 The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules, regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.

10.1.2 The Contractor and all Subcontractors to the Contract must require all on-site employees to complete the ten-hour construction safety training program required under Section 292.675, RSMo, unless they have previously completed the program and have documentation of having done so. The Contractor will forfeit a penalty to the Owner of $2,500 plus an additional $100 for each employee employed by the Contractor or Subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training." (Section 292.675, RSMo).

10.1.3 In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner's Representative and the Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. "Rendered Harmless" shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

10.2 Safety Of Persons and Property

10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide protection to prevent damage, injury, or loss to:

.1 students, faculty, staff, the public, construction personnel, and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor or the Contractor's Subcontractors of any tier; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

10.2.2 The Contractor shall give notices and comply with applicable laws, standards, codes, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise the highest degree of care and carry on such activities under supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property caused in whole or in part by the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, and for which the Contractor is responsible under Article 10, except damage or loss attributable solely to acts or omissions of the Owner or the Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either

of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's other obligations stated elsewhere in the Contract.

10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and the Architect. The Contractor shall hold regularly scheduled safety meetings to instruct the Contractor's personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment and enforce the use of such equipment by its employees and its Subcontractors of any tier.

10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.2.8 The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately.

10.2.9 The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the Work, either by or against the Contractor.

ARTICLE 11
INSURANCE AND BONDS

11.1 Insurance

11.1.1 The Contractor shall secure from the date of the Contract for Construction and maintain for such periods of time as set forth below, insurance of such types and in such amounts specified below, to protect the Contractor, the Owner and others against all hazards or risks of loss described below. The form of such insurance together with carriers thereof, in each case, shall be approved by the Owner, but, regardless of such approval, it shall be the responsibility of the Contractor to maintain the insurance coverages set forth herein.

11.1.2 The Contractor shall not be allowed on the Owner's property without proof of the insurance coverages set forth herein

11.2 Commercial General Liability

11.2.1 The Contractor shall secure and maintain from the date of the Contract, and for a period of at least ten (10) years from the date of Final Completion of the entire Work, Commercial General Liability insurance ("CGL") with a combined single limit of not less than $2,000,000 per occurrence, $5,000,000 general aggregate, $5,000,000 products and completed operations aggregate, and $1,000,000 personal injury and advertising injury. General Aggregate must apply per project. An umbrella policy may be used to satisfy these limits.

11.2.2 CGL insurance shall be written on a Commercial form CG 00 01 or an equivalent form providing the same coverages and shall cover claims and liability in connection with or resulting from the Contractor's operations and activities under the Contract, for personal injuries, occupational sickness, disease, death or damage to property of others, including loss of use resulting therefrom, arising out of any operations or activities of the Contractor, its agents, or any Subcontractors of any tier or by anyone directly or indirectly employed by either of them.

11.2.3 CGL insurance shall include premises, operations, independent contractors, products-completed operations, personal injury and advertising injury and liability assumed under an insured contract (including the tort liability of another assumed in a business contract) coverages. In particular, and not by way of any limitation, the CGL insurance shall cover the Contractor's indemnity obligations contained in the Contract Documents.

11.2.4 There shall be no endorsement or modification of the CGL policy limiting the scope of coverage for liability arising from blasting, explosion, collapse, or underground property damage.

11.2.5 The Contractor waives all rights against the Owner and its agents, officers, representatives, and employees for recovery of damages to the extent those damages are covered by the CGL policy required hereunder.

11.3 Licensed for Use Vehicle Liability

11.3.1 The Contractor shall secure and maintain from the date of the Contract for Construction until the date of Final Completion of the entire Work, insurance, to be on comprehensive form, which shall protect the Contractor against any and all claims for all injuries and all damage to property arising from the use of automobiles, trucks and motorized vehicles, in connection with the performance of Work under this Contract, and shall cover the operation on or off the site of the Work of all motor vehicles licensed for highway use whether they are owned, non-owned or hired. Such insurance shall include contractual liability coverage and shall provide coverage on the basis of the date of any accident. The liability limits under such policy shall not be less than $2,000,000 combined single limit for bodily injury and property damage per accident.

11.3.2 The Contractor waives all rights against the Owner and its agents, officers, directors, and employees for recovery

of damages to the extent such damages are covered by the automobile liability insurance required hereunder.

11.4 Workers' Compensation Insurance

11.4.1 The Contractor shall purchase and maintain workers' compensation insurance and employers' liability insurance which shall protect the Contractor from claims for injury, sickness, disease or death of the Contractor's employees or statutory employees. The insurance policies required hereunder shall include an "all states" or "other states" endorsement. In case any Work is subcontracted, the Contractor shall require any Subcontractor of any tier to provide the insurance coverages required under this Paragraph.

11.4.2 The Contractor's workers' compensation insurance coverage shall be in compliance with all applicable laws, including the statutes of the State of Missouri. The Contractor's employers' liability coverage limits shall not be less than $1,000,000 each accident for bodily injury by accident or $1,000,000 each employee for bodily injury by disease.

11.5 General Insurance Requirements and Professional Liability

11.5.1 Any Consultant/Contractor providing professional design services as part of the Contract shall be required to provide and maintain, from the date of this Contract and for a period of ten (10) years after the date of Final Completion, Professional Liability insurance, in a claims made form, to cover any claims, including but not limited to errors, omissions, and negligence, which may arise from the design and related services performed by the Consultant. The minimum limits for such policy shall be $1,000,000.00 per claim/$1,000,000.00 aggregate.

11.5.2 "The officers, employees, and agents of The Curators of the University of Missouri" shall be added as Additional Insured with respect to the CGL, umbrella/excess and Automobile Liability polices required herein. A certificate of insurance evidencing all coverage required is to be provided at least ten (10) days prior to the inception date of the Contract between the Contractor and the University. The Contractor is required to maintain coverages as stated and required to notify the University of a carrier change or cancellation within two (2) business days. The University reserves the right to request a copy of the policy. The University reserves the right to require higher limits on any contract provided notice of such requirement is stated in the request for proposals for such contract. The Contractor shall request that its insurer(s) include the following disclaimer in any insurance policy, rider or endorsement issued pursuant to this Additional Insured requirement: "Neither the requirement for Additional Insured status nor any of the Contractor's action in compliance with such requirement, either direct or indirect, is intended to be and neither shall be construed as a waiver of any sovereign immunity, governmental immunity or any other type of immunity enjoyed by The Curators of the University of Missouri, the Board of Curators of the University of Missouri, or any of its officers, employees or agents."

The Additional Insured status must be conveyed by using the ISO CG 20 10 (2004) edition or equivalent and the ISO CG 20 37 (2004) edition. The policy shall be endorsed to be primary coverage and any other insurance carried by the Owner shall be excess only and will not contribute with Contractors' insurance. To confirm, the Endorsement should accompany the insurance certificate.

11.5.3 All insurance coverages procured by the Contractor shall be provided by agencies and insurance companies acceptable to and approved by Owner. All insurance coverage shall be provided by insurance companies that are duly licensed to conduct business in the State of Missouri as an admitted carrier, except that the Professional Liability insurance required herein may be provided by any insurance company legally authorized to do business in the State of Missouri. The form and content of all insurance coverage provided by the Contractor are subject to the approval of the Owner. All required insurance coverages shall be obtained and paid for by the Contractor. Any approval of the form, content or insurance company by the Owner shall not relieve the Contractor from the obligation to provide the coverages required herein. All insurance coverage procured by the Contractor shall be provided by insurance companies having policyholder ratings no lower than "A-" and financial ratings not lower than "XI" in the Best's Insurance Guide, latest edition in effect as of the date of the Contract, and subsequently in effect at the time of renewal of any policies required by the Contract Documents. Insurance coverages required hereunder shall not be subject to a deductible amount on a per-claim basis of more than $10,000.00 and shall not be subject to a per-occurrence deductible of more than $25,000.00. Insurance procured by the Contractor covering the Additional Insureds shall be primary insurance and any insurance maintained by Owner shall be excess insurance.

11.5.4 All insurance required hereunder shall provide that the insurer's cost of providing the insureds a defense and appeal, including attorneys' fees, shall be supplementary and shall not be included as part of the policy limits but shall remain the insurer's separate responsibility. The Contractor shall cause its insurance carriers for all required coverages, except for workers' compensation, to waive all rights of subrogation against the Owner and its officers, employees and agents.

11.5.5 The Contractor shall furnish the Owner with certificates, Additional Insured endorsements, policies, or binders which indicate the Contractor and/or the Owner and other Contractors (where required) are covered by the required insurance showing type, amount, class of operations covered, effective dates and dates of expiration of policies prior to commencement of the Work. The Contractor is required to maintain coverages as stated and required to notify the University of a carrier change or cancellation within two (2) business days. The University reserves the right to request a copy of the policy. The Contractor fails to provide, procure, and deliver acceptable policies of insurance or satisfactory

certificates or other evidence thereof, the Owner may obtain such insurance at the cost and expense of the Contractor without notice to the Contractor.

11.5.6 With respect to all insurance coverages required to remain in force and affect after final payment, The Contractor shall provide the Owner additional certificates, policies and binders evidencing continuation of such insurance coverages along with the Contractor's application for final payment and shall provide certificates, policies and binders thereafter as requested by the Owner.

11.5.7 The maintenance in full current force and effect of such forms and amounts of insurance and bonds required by the Contract Documents shall be a condition precedent to the Contractor's exercise or enforcement of any rights under the Contract Documents.

11.5.8 Failure of the Owner to demand certificates, policies and binders evidencing insurance coverages required by the Contract Documents, approval by the Owner of such certificates, policies and binders or failure of the Owner to identify a deficiency from evidence that is provided by the Contractor shall not be construed as a waiver of the Contractor's obligations to maintain the insurance required by the Contract Documents.

11.5.9 The Owner shall have the right to terminate the Contract if the Contractor fails to maintain the insurance required by the Contract Documents.

11.5.10 If the Contractor fails to maintain the insurance required by the Contract Document, the Owner shall have the right, but not the obligation, to purchase said insurance at Contractor's expense. If the Owner is damaged by the Contractor's failure to maintain the insurance required by the Contract Documents, the Contractor shall bear all reasonable costs properly attributable to such failure.

11.5.11 By requiring the insurance set forth herein and in the Contract Documents, the Owner does not represent or warrant that coverage and limits will necessarily be adequate to protect the Contractor, and such coverages and limits shall not be deemed as a limitation on the Contractor's liability under the indemnities granted to the Owner in the Contract Documents. For those policies requiring the Owner to be added as an Additional Insured, as set forth herein, the Owner and all other indemnified parties shall be an Additional Insured for the full limits carried by the Contractor, not just the limits required herein.

11.5.12 If Contractor's liability policies do not contain a standard separation of insureds provision, such policies shall be endorsed to provide cross-liability coverage.

11.5.13 If a part of the Work hereunder is to be subcontracted, the Contractor shall: (1) cover any and all Subcontractors in its insurance policies; (2) require each Subcontractor to secure insurance which will protect said Subcontractor and supplier against all applicable hazards or risks of loss designated in accordance with Article 11; and (3) require each Subcontractor or supplier to assist in every manner possible in the reporting and investigation of any accident, and upon request, to cooperate with any insurance carrier in the handling of any claim by securing and giving evidence and obtaining the attendance of witnesses as required by any claim or suit.

11.5.14 It is understood and agreed that the insurance coverages required by the provisions of this Contract are required in the public interest and that the Owner does not assume any liability for acts of the Contractor or Subcontractors of any tier or their employees in the performance of the Contract or Work.

11.6 Builder's Risk Insurance

11.6.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the State of Missouri, as an admitted carrier, builder's risk insurance on the entire Work. Such insurance shall be written on a completed value form for the entire Work. The insurance shall apply on a replacement cost basis.

11.6.2 The insurance as required herein shall name as insureds the Owner, the Contractor, and all Subcontractors of any tier. The insurance policy shall contain a provision that the insurance will not be canceled, allowed to expire or materially changed until at least thirty (30) days prior written notice has been given to the Owner.

11.6.3 The insurance as required herein shall cover the entire Work, including reasonable compensation for Architect's services and expenses made necessary by an insured loss. Insured property shall include portions of the Work located away from the site (including all offsite stored materials) but intended for use at the site and shall also cover portions of the Work in transit. The policy shall include as insured property scaffolding, falsework, and temporary buildings located at the site. The policy shall cover the cost of removing debris, including demolition as may be made legally necessary by the operation of any law, ordinance, or regulation.

11.6.4 The insurance required herein shall be on an all risk form and shall be written to cover all risks of physical loss or damage to the insured party and shall insure at least against the perils of fire and extended coverage, theft, vandalism, malicious mischief, collapse, lightening, earthquake, flood, frost, water damage, windstorm and freezing.

11.6.5 If there are any deductibles applicable to the insurance required herein, the Contractor shall pay any part of any loss not covered because of the operation of such deductibles.

11.6.6 The insurance as required herein shall be maintained in effect until the earliest of the following dates:

.1 the date which all persons and organization who are insureds under the policy agree in writing that it shall be terminated;

.2 the date on which final payment of this Contract has been made by the Owner to the Contractor; or

.3 the date on which the insurable interests in the property of all insureds other than the Owner have ceased.

11.6.7 The Owner and the Contractor waive all rights against (1) each other and any of their Subcontractors of any tier, suppliers, agents and employees, each of the other, (2) the Architect and Architect's consultants, and (3) separate contractors described in Article 6, if any, and any of their subcontractors of any tier, suppliers, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance or other insurance applicable to the Work, except such rights as they have to proceeds of such insurance. The Owner or the Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the Subcontractors of any tier, suppliers, agents, and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, was at fault or was negligent in causing the loss and whether or not the person or entity had an interest in the property damaged.

11.6.8 A loss insured under the Contractor's property insurance shall be adjusted by the Owner in good faith and made payable to the Owner for the insureds, subject to requirements of the Contract Documents. The Contractor shall pay Subcontractors of any tier their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors of any tier to make payments to their Sub-subcontractors in similar manner. The Contractor shall waive its rights to subrogation for any loss or damage to the Contractor's property or equipment coverage in favor of the Owner and other indemnified parties.

11.7 Bonds

11.7.1 When the Contract Sum exceeds Fifty Thousand Dollars ($50,000), the Contractor shall procure and furnish a Performance Bond and a Payment Bond in the form prepared by the Owner, each in an amount equal to one hundred percent (100%) of the Contract Sum, as well as adjustments to the Contract Sum. The Performance Bond shall secure and guarantee the Contractor's faithful performance of this Contract, including but not limited to the Contractor's obligation to correct defects after final payment has been made as required by the Contract Documents. The Payment Bond shall secure and guarantee payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract. These Bonds shall be in effect through the duration of the Contract plus the Guaranty Period as required by the Contract Documents.

11.7.2 The bonds required hereunder shall be executed by a responsible surety licensed in the State of Missouri, with a Best's rating of no less than A-/XI. The Contractor shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of this power of attorney indicating the monetary limit of such power.

11.7.3 If the surety of any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to conduct business in the State of Missouri is terminated, or it ceases to meet the requirements of this Section, the Contractor shall within ten (10) days substitute another bond and surety, both of which must be acceptable to the Owner. If Contractor fails to make such substitution, the Owner may procure such required bonds on behalf of the Contractor at the Contractor's expense.

11.7.4 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds to such person or entity.

11.7.5 The Contractor shall keep the surety informed of the progress of the Work, and, where necessary, obtain the surety's consent to or waiver of: (1) notice of changes in the Work; (2) request for reduction or release of retention; (3) request for final payment; and (4) any other material required by the surety. The Owner shall be notified by the Contractor, in writing, of all communications with the surety, as it relates to items one through four. The Owner may, in the Owner's sole discretion, inform surety of the progress of the Work, any defects in the Work, or any defaults of the Contractor under the Contract Documents and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under and pursuant to any bond issued in connection with the Work.

11.7.6 The Contractor shall indemnify and hold harmless the Owner and any agents, employees, representative or member of the Board of Curators from and against any claims, expenses, losses, costs, including reasonable attorneys' fees, as a result of any failure of the Contractor to procure the bonds required herein.

ARTICLE 12
UNCOVERING AND CORRECTION OF THE WORK

12.1 Uncovering of the Work

12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it shall, if required in writing by the Architect or the Owner's Representative, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.

12.1.2 If a portion of the Work has been covered which the Architect or the Owner's Representative has not specifically requested to observe, prior to its being covered, the Architect or the Owner's Representative may request to see such Work, and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate contractor in which event the Owner will be responsible for payment of such costs.

12.2 Correction of the Work

12.2.1 The Architect or the Owner's Representative shall have the right to reject Work not in strict compliance with the requirements of the Contract Documents. The Contractor shall promptly correct Work rejected by the Architect or the Owner's Representative for failing to conform to the requirements of the Contract Documents, whether observed before or after final completion and whether or not fabricated, installed, or completed. If Work has been rejected by the Architect or the Owner's Representative, the Architect or the Owner's Representative shall have the right to require the Contractor to remove it from the Project site and replace it with Work that strictly conforms to the requirements of the Contract Documents regardless, if such removal and replacement results in "economic waste." The Contractor shall pay all claims, costs, losses and damages caused by or resulting from the correction, removal or replacement of defective, or non-compliant Work, including but not limited to, all costs of repair or replacement of Work of others. The Contractor shall bear costs of correcting, removing and replacing such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby. If prior to the date of final payment, the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

12.2.2 If, within twelve (12) months after the date of Final Completion of the Work or designated portion thereof, 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 not to be in strict accordance with the requirements of the Contract Documents, the Contractor shall correct or remove and replace such defective Work, at the Owner's discretion. Such twelve (12) month period is referred to as the "Guarantee Period." The obligations under this Paragraph shall cover any repairs, removal, and replacement to any part of the Work or other property caused by the defective Work.

12.2.3 The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

12.2.4 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct or remove it and replace such nonconforming Work. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Owner, the Owner may take action to correct or remove the nonconforming work at the Contractor's expense.

12.2.5 The Contractor shall bear the cost of correcting destroyed or damaged Work or property, whether completed or partially completed, of the Owner or of others caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

12.2.6 Nothing contained in Article 12 shall be construed to establish a period of limitation with respect to other obligations that the Contractor might have under the Contract Documents. Establishment of the twelve (12) month Guarantee Period as described in Article 12 relates only to the specific obligation of the Contractor to correct, remove or replace the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations under the Contract Documents. The requirements of Article 12 are in addition to and not in limitation of any of the other requirements of the Contract for warranties or conformance of the Work to the requirements of the Contract Documents.

12.3 Acceptance of Nonconforming Work

12.3.1 The Owner may accept Work which is not in accordance with the Contract Documents, instead of requiring its removal and correction, in its sole discretion. In such case, the Contract Sum will be adjusted as appropriate and equitable. Such adjustment shall be made whether or not final payment has been made. Nothing contained herein shall impose any obligation upon the Owner to accept nonconforming or defective Work.

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.1 Written Notice

13.1.1 All notices required to be given by the Contractor under the terms of this Contract shall be made in writing. Written notice when served by the Owner will be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an office of the corporation for which it was intended, or if delivered at or sent to the last business address known to the party giving notice.

13.2 Rights and Remedies

13.2.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

13.2.2 No action or failure to act by the Owner, the Architect, or the Owner's Representative will constitute a waiver of a right or duty afforded to the Owner under the Contract Documents, nor will such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

13.2.3 The terms of this Contract and all representations, indemnifications, warranties and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Work and shall remain in effect so long as the Owner is entitled to protection of its rights under applicable law.

13.2.4 The Contractor shall carry out the Work and adhere to the current construction schedule during all disputes or disagreements with the Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements except as the Owner and the Contractor may otherwise agree to in writing.

13.3 Tests and Inspections

13.3.1 Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, codes, or regulations shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory, the Owner's Authorized Agent, or entity acceptable to the Owner, and the Contractor shall bear related costs of tests, inspections, and approvals as required in the Contract Documents. The Contractor shall give the Architect, the Owner's Representative, and the Owner's Authorized Agent timely notice of when and where tests and inspections are to be made so the Architect, the Owner's Representative and/or the Owner's Authorized Agent may observe procedures or perform the necessary tests or inspections.

13.3.2 If the Architect, the Owner's Representative, or the Owner's Authorized Agent determine that portions of the Work require additional testing, inspection or approval not included in the Contract Documents, or required by law, the Architect, or the Owner's Representative will instruct the Contractor to make arrangements for such additional testing, inspection, or approval by an entity acceptable to the Owner's Representative and the Contractor shall give timely notice to the Architect, the Owner's Representative or the Owner's Authorized Agent, of when and where tests and inspections are to be made so the Architect, the Owner's Representative and/or the Owner's Authorized Agent , may choose that the tests or inspections can be performed or observed. The Owner will bear such costs except as provided elsewhere in Article 13.

13.3.3 If such procedures for testing, inspection, or approval under Article 13 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's and Owner's Authorized Agent's services and expenses.

13.3.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor, and promptly delivered to the Owner's Representative and the Architect.

13.3.5 The Contractor shall take all necessary actions to ensure that all tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.3.6 The Contractor shall arrange for and pay for all costs of all testing required by the Contract Documents or any applicable laws for materials to be tested or certified at or on the place or premises of the source of the material to be supplied. The Owner shall have the right to require testing of all materials at the place of the source of the material to be supplied if not required by the Contract Documents or any applicable laws. The Owner shall bear the costs of such tests and inspections not required by the Contract Documents or by applicable laws, unless prior defective Work provides the Architect or the Owner with a reasonable belief that additional defective Work may be found, in which case the Contractor shall be responsible for all costs of tests and inspections ordered by the Owner or the Architect, whether or not such tests or inspection reveals that Work is in compliance with the Contract Documents.

13.4 Nondiscrimination

13.4.1 In connection with the furnishing of equipment, supplies, and/or services under the Contract, the Contractor and all subcontractors shall not discriminate against any recipients of services, or employees or applicants for employment on the basis of race, color, national origin, ancestry, religion, sex, pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, or any other status protected by applicable state or federal law.

13.4.2 The University serves from time to time as a contractor for and/or receives grant funding from the United States government and/or State of Missouri. Accordingly, the Contractor shall comply with all applicable state and federal laws, rules, regulations and executive orders applicable to subcontractors of government contractors or to contractors of grant recipients, including those relating to equal employment of minorities, women, persons with disabilities, certain veterans and based on sexual orientation and gender identity, as each may be amended from time to time. Contract clauses required by the

United States government or State of Missouri in such circumstances are incorporated herein by reference.

13.5 MBE/WBE/SDVE Participation Goals

13.5.1 The Contractor shall provide participation of MBE/WBE/SDVE Firms in the Project, through self-performance, if a MBE/WBE/SDVE Firm, or by subcontracting with MBE/WBE/SDVE Firms as Subcontractors, suppliers or manufacturers, in an amount that is no less than the percent of the Contract Sum that was promised in the Contractor's bid and/or the amount accepted by the Owner.

13.5.2 If the Contractor must remove any MBE/WBE/SDVE Firm as a Subcontractor, supplier or manufacturer under the Contract, the Contractor shall replace the MBE/WBE/SDVE Firm with one or more MBE/WBE/SDVE Firms in an amount equal to the dollar value of the work awarded to the MBE/WBE/SDVE Firm that was removed. The Contractor shall immediately notify the Owner's Representative in writing of the Contractor's intent to remove any MBE/WBE/SDVE Firm as a Subcontractor, supplier or manufacturer, and the Contractor's plan to provide the promised amount of MBE/WBE/SDVE Participation. All changes of a MBE/WBE/SDVE Firm as a Subcontractor of any tier, supplier or manufacturer under the Contract shall be approved by the Executive Director of Facilities Planning and Development.

13.5.3 If the Contractor fails to meet or to maintain the promised amount of MBE/WBE/SDVE Participation, the Contractor shall immediately notify in writing the Owner's Representative and the Executive Director of Facilities Planning and Development. Such notice shall include a description of the Contractor's good faith effort to provide the promised MBE/WBE/SDVE Participation.

13.5.4 If the Executive Director of Facilities Planning and Development finds that the Contractor has failed to comply in good faith with the promised MBE/WBE/SDVE Participation the Executive Director may take appropriate action, including but not limited to, declaring the Contractor ineligible to participate in any contracts with the Owner for a period not to exceed six (6) months, and/or directing that the Contractor's actions be declared a material breach of the Contract and that the Contract be terminated.

13.5.5 In the enforcement of the non-discrimination requirements in Section 13.4 and 13.5, the Owner may use any reasonable procedures available, including but not limited to: requests, reports, site visits, and inspection of relevant documents of Contractors and Subcontractors of any tier. The Contractor shall submit a final Affidavit of MBE/WBE/SDVE Participation for each MBE/WBE/SDVE Firm at the end of the project stating the actual amount paid to the MBE/WBE/SDVE Firm.

13.6 Wage Rates (If the Contract amount is less than $75,000, the requirements of this Section will not apply. Any adjustments that increase the Contract cost above $75,000 will be subject to this Section, per Section 290.230, RSMo.)

13.6.1 The Contractor and its Subcontractors shall pay all workers performing work under the Contract not less than the prevailing hourly rate of wages or the public works contracting minimum wage, whichever is applicable, as set out in the Annual Wage Order that is attached to and made part of the specifications for work under the Contract, in accordance with Sections 290.210 to 290.340, RSMo (Missouri Prevailing Wage Law) and related regulations. The Annual Wage Order(s) published by the Missouri Department of Labor and Industrial Relations (MDLIR) for the location where the Work is performed is incorporated into the Contract by this reference. The Contractor shall use applicable MDLIR regulations, including, but not limited to, 8 CSR 30-3.010-3.060, in determining the appropriate occupational titles and rates for workers used in the execution of this Contract. All determinations and/or interpretations regarding wage rates and classification of workers will be made by the office of the University of Missouri Executive Director of Facilities Planning and Development.

13.6.2 If this Project is financed in whole or in part from Federal funds (as indicated in the bid or Contract Documents), then this Contract shall be subject to all applicable federal labor statutes, rules, and regulations, including provisions of the Davis-Bacon Act, 40 U.S.C. § 3141 et seq., and the "Federal Labor Standards Provisions." Where the Missouri Prevailing Wage Law and the Davis-Bacon Act require payment of different wages for work performed under this Contract, the Contractor and all Subcontractors shall pay the greater of the wages required under either law, on a classification-by-classification basis.

13.6.3 The Contractor will forfeit a penalty to the Owner of $100 per day (or portion of a day) for each worker that is paid less than the specified rate for any work done under the Contract by the Contractor or by any Subcontractor. The Owner shall deduct from any unpaid amounts then or thereafter due the Contractor under the Contract all sums and amounts due and owing as a result of any violation of Sections 290.210 to 290.340, RSMo. (Section 290.250, RSMo) The Contractor agrees to abide by any decision made by the Owner regarding underpayment of wages to workers and amounts owed them as well as penalties for underpayment of wages.

13.6.4 The prevailing wage rate(s) and public works contracting minimum wage(s) included in the Annual Wage Order(s) include fringe benefits as set forth in Sections 290.219 and 290.257, RSMo. Fringe benefit payments may be made to the worker in cash, or irrevocably made by a Contractor or Subcontractor to a trustee or to a third person pursuant to a fund, plan or program, or pursuant to an enforceable commitment, or any combination thereof, to carry out a financially responsible plan or program which was communicated in writing to the workmen affected, for medical

or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the Contractor or Subcontractor is not required by other federal or state law to provide any of the benefits as referenced in Section 290.210(5), RSMo.

13.6.5 The Contractor shall make full payment of the applicable required wages to workers in legal tender. Pay for travel, mileage, meals, bonuses, or other expenses are not fringe benefits and cannot be considered part of the workers wage rate. The Contractor shall not make any deductions for food, sleeping accommodations, transportation, use of small tools, uniforms, or anything of any kind or description, unless the Contractor and employee enter into an agreement in writing at the beginning of the worker's term of employment, and such agreement is approved by the Owner as fair and reasonable in accordance with Section 290.315, RSMo.

13.6.6 The Contractor shall submit to the Owner with the Contractor's periodic pay request, certified payroll records for labor performed by the Contractor and Subcontractors of any tier. The Contractor shall submit all required certified payroll information records electronically in pdf format using the Owner's web-based payment program. The certified payroll forms shall contain the name, address, personal identification number, and occupational title of the workers as well as the hours they work each day. Do not include personal social security numbers in payroll records. The Owner's acceptance of certified payroll records does not in any way relieve the Contractor of any responsibility for the payment of prevailing wages to workers on the project. The Contractor shall also maintain copies of the certified payroll records. The Owner may, at any time, request copies of, and/or inspect all of the Contractor's payroll records for the Work to verify compliance. The Contractor shall furnish the Owner copies of payroll records within ten (10) days of the Owner's written request. The Contractor shall provide copies of workers I-9 forms within twenty-four (24) hours of written notice. Such payroll records shall be maintained in accordance with Article 13.7.1 and shall be available for inspection for two (2) years after final completion of the Work. Falsification of the certified payroll records may result in the debarment of the Contractor or Subcontractor from future work with the University.

13.6.7 If applicable, the Contractor shall comply with the Copeland "Anti-Kick Act, 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

13.6.8 The Contractor shall specifically incorporate the obligations of Section 13.6 into the subcontracts, supply agreements and purchase orders for the Work and require the same of any Subcontractors of any tier.

13.6.9 If Contractor fails to comply with the provisions of Section 13.6 of this Contract or with Sections 290.210 to 290.340, RSMo and related regulations, the Owner may, in its sole discretion, immediately terminate the Contract upon written notice. The rights and remedies of the Owner provided herein shall not be exclusive and are in addition to other rights and remedies provided by law or under this Contract.

13.6.10 The Contractor may pay entry-level workers or federally-registered apprentices fifty percent (50%) of the pay of a journeyman in their same occupational title, in accordance with Section 290.235, RSMo and 8 CSR 30-3.030. Per 8 CSR 30-3.030, an entry-level worker is "[a]ny worker who is not a journeyman and who is not otherwise enrolled in a federally-registered apprenticeship program but is participating in an on-the-job training program provided by the contractor for whom they perform work on a public construction project." The University of Missouri may require documentation showing, to the University's sole satisfaction, that an entry-level worker is participating in an on-the-job training program with the Contractor. The combined total of such entry-level workers and federally registered apprentices shall not exceed a one-to-one ratio with the number of journeyman workers in any occupational title on the project.

13.6.11 The Contractor shall post the wage rates for the Contract in a dry, accessible place at the field office on the project or, where there is no field office, at the Contractor's local office or batch plant so long as a copy is provided to workers upon request, as required by 8 CSR 30-3.050. The wage rates shall be kept in a clearly legible condition for the duration of the project.

13.6.12 Neither the Contractor, nor any Subcontractor of any tier, nor any person hired by them or acting on their behalf, shall request, demand or receive, either before or after such worker is engaged, that such worker pay back, return, donate, contribute, or give any part or all of said worker's wages, salary, or thing of value, to any person, upon the statement, representation, or understanding that failure to comply with such request or demand will prevent such worker from procuring or retaining employment, and no person shall, directly or indirectly, pay, request or authorize any other person to violate this Section as set forth in Section 290.305, RSMo, the exception being to an agent or representative of a duly constituted labor organization acting in the collection of dues or assessments of such organization. No Contractor or Subcontractor may directly or indirectly receive a wage subsidy, bid supplement, or rebate for employment on this project if such wage subsidy, bid supplement, or rebate has the effect of reducing the wage rate paid by the employer on a given occupational title below the applicable wage rate as provided in the Contract. In the event a wage subsidy, bid supplement, or rebate is provided or received, the entity receiving such subsidy, supplement, or rebate shall report the

date and amount of such subsidy, supplement, or rebate to the University within thirty days of receipt of payment. This disclosure report shall be a matter of public record.

13.6.13 The Contractor will pay workers overtime for all hours worked over ten (10) hours per day and forty (40) hours per week in accordance with Section 290.230, RSMo. For all overtime work performed, not less than one and one-half the prevailing hourly rate of wages for work of a similar character in the locality in which the Work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid. For all work performed on a Sunday or holiday, not less than twice the prevailing hourly rate of pay or public works contracting minimum wage will apply in accordance with Section 290.230, RSMo. For purposes of this Section, holidays are as follows: January first, the last Monday in May, July fourth, the first Monday in September, November 11, the fourth Thursday in November, December twenty-fifth. If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

13.7 Records

13.7.1 The Owner, or any parties it deems necessary, shall have access to and the right to examine any accounting or other records of the Contractor involving transactions and Work related to this Contract for five (5) years after final payment or five (5) years after the final resolution of any on going disputes at the time of final payment. All records shall be maintained in accordance with generally accepted accounting procedures, consistently applied. Subcontractors of any tier shall be required by Contractor to maintain records and to permit audits as required of Contractor herein.

13.8 Codes and Standards

13.8.1 The Work shall be performed to comply with the International Code Council (ICC) Codes, and the codes and standards noted below. The latest editions and supplements of these codes and standards in effect on the date of the execution of the Contract for Construction shall be applicable unless otherwise designated in the Contract Documents. Codes and standards required by accreditation agencies will also be used unless the ICC requirements are more stringent. In the event that special design features and/or construction systems are not covered in the ICC codes, the applicable edition of the National Fire Protection Association (NFPA) family of standards and/or the NFPA 101 Life Safety Code shall be used.

.1 ICC International Building Code and reference standards
.2 ICC International Plumbing Code
.3 ICC International Mechanical Code
.4 ICC International Fire Code
.5 ICC International Fuel Gas Code
.6 NFPA 70 National Electric Code (NEC)
.7 Americans with Disabilities Act – Standards for Accessible Design.
.8 American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks as published by the American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI) A17.1
.9 NFPA 101 Life Safety Code (as noted above)
.10 American Concrete Institute (ACI)
.11 American National Standards Institute (ANSI)
.12 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
.13 American Refrigeration Institute (ARI)
.14 American Society for Testing and Materials (ASTM)
.15 Missouri Standard Specification for Highway Construction, Missouri State Highway Commission
.16 National Electrical Manufacturers Association (NEMA)
.17 Underwriter's Laboratories, Inc. (UL), Federal Specifications
.18 Williams Steiger Occupational Safety and Health Act of 1970 (OSHA)

13.9 General Provisions

13.9.1 Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

13.9.2 This Contract shall be interpreted, construed, enforced, and regulated under and by the laws of the State of Missouri. Whenever possible, each provision of this Contract shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Contract, or a portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without invalidating or affecting the remaining provisions of this Contract or valid portions of such provision, which are hereby deemed severable. The Contractor and the Owner further agree that in the event any provision of this Contract, or a portion thereof, is prohibited by law or found invalid under any law, this Contract shall be reformed to replace such prohibited or invalid provision or portion thereof with a valid and enforceable provision which comes as close as possible to expressing the intention of the prohibited or invalid provision.

13.9.3 The Contractor and the Owner each agree that the State of Missouri Circuit Court for the County where the Project is located shall have exclusive jurisdiction to resolve all Claims and any issue and disputes between the Contractor and the Owner. The Contractor agrees that it shall not file any petition, complaint, lawsuit or legal proceeding against the Owner in any other court other than the State of Missouri Circuit Court for the County where the Project is located.

13.9.4 The Owner's total liability to the Contractor and anyone claiming by, through, or under the Contractor for any Claim, cost, loss, expense, or damage caused in part by the fault of the Owner and in part by the fault of The Contractor or any other entity or individual shall not exceed the percentage share

that the Owner's fault bears to the total fault of the Owner, the Contractor and all other entities and individuals as determined on the basis of comparative fault principles.

13.9.5 The Contractor agrees that the Owner shall not be liable to the Contractor for any special, indirect, incidental, or consequential damage whatsoever, whether caused by the Owner's negligence, fault, errors or omissions, strict liability, breach of contract, breach of warranty or other cause or causes whatsoever. Such special, indirect, incidental or consequential damages include, but are not limited to loss of profits, loss of savings or revenue, loss of anticipated profits, labor inefficiencies, idle equipment, home office overhead, and similar types of damages.

13.9.6 Nothing contained in this Contract or the Contract Documents shall create any contractual relationship with or cause of action in favor of a third party against the Owner.

13.9.7 No member or officer of the Board of Curators of the University incurs or assumes any individual or personal liability under the Contract or by reason of the default of the Owner in the performance of any terms thereof. The Contractor releases and discharges all members or officers of the Board of Curators of the University from any liability as a condition of and as consideration for the award of the Contract to the Contractor.

13.9.8 The Contractor hereby binds itself, its partners, successors, assigns and legal representatives to the Owner in respect to covenants, agreements and obligations contained in the Contract Documents. The Contractor shall not assign the Contract or proceeds hereof without written consent of the Owner. If the Contractor attempts to make such an assignment without such consent, it shall be void and confer no rights on third parties, and the Contractor shall nevertheless remain legally responsible for all obligations under the Contract. The Owner's consent to any assignment is conditioned upon the Contractor entering into a written assignment which contains the following language: "It is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor and to claims and to liens for services rendered or materials supplied for the performance of the Work required in said Contract in favor of all persons, firms, corporations rendering such services or supplying such materials."

13.10 Certifications

13.10.1 Suspension and Debarment

The Contractor certifies to the best of its knowledge and belief that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any department or agency in accordance with Federal Executive Orders 12549 (2/18/86) and 12689 (8/15/89).

13.10.2 Anti-Discrimination Against Israel Act

If this Contract is for $100,000 or more, and if the Contractor is a company with ten (10) or more employees, then Contractor certifies that it, and any company affiliated with it, does not boycott Israel, and will not boycott Israel during the term of this Contract. In this Paragraph, the terms "company" and "boycott Israel" shall have the meanings described in Section 34.600 of the Missouri Revised Statutes.

13.10.3 Byrd Anti-Lobbying Amendment

.1 If this Contract exceeds $100,000 and is funded by Federal funding, Contractor agrees to file the required certification, in compliance with 31 U.S.C. § 1352 (as amended).

.2 Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352.

.3 Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

13.10.4 Work Authorization

The Contractor and all subcontractors performing work under this Contract shall enroll and participate in a federal work authorization program operated by the United States Department of Homeland Security, E-Verify or an equivalent federal work authorization program, to verify information of newly hired employees, under the Immigration Reform and Control Act of 1986 (IRCA), P.L.99-603. By executing a contract with The Curators of the University of Missouri, the Contractor shall affirm its enrollment and participation in a federal work authorization program with respect to the employees working in connection with the contracted service and affirm that it does not knowingly employ any person who is an unauthorized alien in connection with the contracted services. The Contractor shall maintain documentation of its participation in a federal work authorization program and make such documentation available to the University upon request.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 Termination by Owner for Cause

14.1.1 In addition to other rights and remedies granted to the Owner under the Contract Documents and by law, the Owner may terminate the Contract if the Contractor:

.1 refuses or fails to supply enough properly skilled workers, superintendents, foremen, or managers;

.2 refuses or fails to supply sufficient or proper materials;

.3 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.4 disregards laws, ordinances, rules, codes, regulations or orders of an authority having jurisdiction;

.5 disregards the authority of the Owner's Representative, the Architect, or the Owner's Authorized Agent;
.6 breaches any warranty or representations made by the Contractor under or pursuant to the Contract Documents;
.7 fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all the requirements of the Contract Documents;
.8 fails after commencement of the Work to proceed continuously with the construction and completion of the Work for more than ten (10) days, except as permitted under the Contract Documents;
.9 fails to maintain a satisfactory rate of progress with the Work or fails to comply with approved progress schedules; or
.10 violates in any substantial way any provisions of the Contract Documents.

14.1.2 When any of the above reasons exist, the Owner may, without prejudice to any other rights or remedies of the Owner, terminate this Contract by delivering a written notice of termination to the Contractor and the Contractor's surety, and may:
.1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
.2 accept assignment of subcontracts pursuant to Section 5.3; and
.3 finish the Work by whatever reasonable method the Owner may deem expedient, including turning the Work over to the surety.

14.1.3 The Contractor, in the event of a termination under Section 14.1, shall not be entitled to receive any further payments under the Contract until the Work is completed in its entirety. Then, if the unpaid balance under the Contract shall exceed all expenses of the Owner in finishing the Work, including additional compensation for the Architect's services and expenses made necessary thereby, such excess will be paid to the Contractor; but, if such expenses of the Owner to finish the Work shall exceed the unpaid balance, the Contractor and its surety shall be liable for, and shall pay the difference and any damages to the Owner. The obligation of the Contractor and its surety for payment of said amounts shall survive termination of the Contract.

14.1.4 In exercising the Owner's right to secure completion of the Work under any of the provisions hereof, the Owner shall have the right to exercise the Owner's sole discretion as to the manner, methods, and reasonableness of costs of completing the Work.

14.1.5 The rights of the Owner to terminate pursuant to Article 14.1 will be cumulative and not exclusive and shall be in addition to any other remedy provided by law or the Contract Documents.

14.1.6 Should the Contractor fail to achieve Final Completion of the Work within thirty (30) calendar days following the date of Substantial Completion, the Owner may exercise its rights under Section14.1.

14.2Suspension by the Owner for Convenience

14.2.1 The Owner may, without cause, order the Contractor in writing to suspend, delay, or interrupt the Work in whole or in part for such period of time as the Owner may determine.

14.2.2 An adjustment will be made to the Contract Sum for increases in the cost of performance of the Contract caused by suspension, delay or interruption. However, in the event of a suspension under Section 14.2, Contractor hereby waives and forfeits any claims for payment of any special, indirect, incidental or consequential damages such as lost profits, loss of savings or revenue, loss of anticipated profits, idle labor or equipment, home office overhead, and similar type damages. No adjustment will be made to the extent:
.1 that performance is, was, or would have been so suspended, delayed or interrupted by another cause for which the Contractor in whole or in part is responsible, or
.2 that an equitable adjustment is made or denied under another provision of this Contract.

14.3 Owner's Termination for Convenience

14.3.1 The Owner may, at any time, terminate the Contract in whole or in part for the Owner's convenience and without cause. Termination by the Owner under this Paragraph shall be by a notice of termination delivered to the Contractor specifying the extent of termination and the effective date.

14.3.2 Upon receipt of a notice of termination for convenience, the Contractor shall immediately, in accordance with instructions from the Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:
.1 cease operation as specified in the notice;
.2 place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete Work not terminated;
.3 terminate all subcontracts and orders to the extent they relate to the Work terminated;
.4 proceed to complete the performance of Work not terminated; and
.5 take actions that may be necessary, or that the Owner may direct, for the protection and preservation of the terminated Work.

14.3.3 Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions and for all Owner approved claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors and suppliers. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation,

anticipated profits, consequential damages and other economic losses.

14.3.4 The Owner shall be credited for (1) payments previously made to the Contractor for the terminated portion of the Work, (2) claims which the Owner has against the Contractor under the Contract and (3) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

14.3.5 Upon determination by a court that termination of Contractor or its successor in interest pursuant to Section 14.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Section 14.3, and Contractor's sole and exclusive remedy for wrongful termination is limited to recovery of the payments permitted for termination for convenience as set forth in ++

SECTION 1.E

SPECIAL CONDITIONS

1. DEFINITIONS

a. "Drawings"

Drawings referred to in and accompany Project Manual consist of Drawings prepared by and bearing the name of the below defined Architect, bearing Date of September 8, 2025, entitled "Walton Stadium Track and Soccer Surface Upgrade", project number CP251272.

a. Civil Engineer/Project Lead
Crockett Engineering Consultants, LLC
Tim D. Crockett, PE
1000 W. Nifong Blvd., Bldg. 1
Columbia, MO 65203
573-447-0292

b. Mechanical & Electrical Engineer
J-Squared Engineering
James P. Watson, PE
2400 Bluff Creek Drive, Suite 101
Columbia, MO 65201
573-234-4492

c. Structural Engineer
Crockett Engineering Consultants, LLC
Gregory L. Linneman, PE
1000 W. Nifong Blvd., Bldg. 1
Columbia, MO 65203
573-447-0292

d. Landscape Architect
VSR Design
Vance Rzepka, PLA
913-484-5211

e. Other Definitions: See Article 1., General Conditions

2. SPECIAL SCHEDULING REQUIREMENTS

a. Normal working hours are defined as weekdays between the hours of 7:00 AM and 5:00 PM. Access and work efforts outside of these normal working hours to be coordinated with the owner's representative.

b. Building Shutdown and Outages will need to be scheduled with the Owner's Representative(s) and Mizzou Athletics.

c. Construction contractor may not begin work onsite in the designated areas until the conclusion of the Fall Soccer Season, November 3, 2025. Contractor will need to start submission of submittals upon Notice to Proceed.

d. Work for the soccer playing field will need to be completed by June 26, 2026 before the start of the 2026 Mizzou Soccer Season practices. If the work cannot be completed it will need to be discussed with the Owner's Representatives. Work for the soccer practice field will be the second priority of the two turf installation projects.

e. If work is not completed on the Alternate #1 (if it is accepted) on the soccer practice field by July 20, 2026 coordination between Mizzou Athletics Football and Soccer team camps and practices may need to be coordinated with the Owner's Representatives. If work on the track cannot be substantially completed by the start of the Fall Soccer meets, the track will need to be made safe for game day operations. Work for these activities will need to be coordinated with the Owner's Representative.

f. Work will need to be coordinate along the pathway between track facility and Taylor Stadium to allow for the Owner to maintain the football practice fields.

3. SCOPE OF WORK

a. The Contractor shall furnish all labor, materials, tools, equipment necessary for, and incidental to, construction of this project as indicated on the Drawings and specified herein.

b. Work shall include everything requisite and necessary to finish work properly, notwithstanding that every item of labor or materials or accessories required to make project complete may not be specifically mentioned.

c. General Description of Work:

(1) Project consists of removal of existing track and soccer field, subbase, underdrains, irrigation and installation of new track and soccer field with

association underdrain, irrigation, pavement and associated site improvements.

(2) Demolition shall consist of removal of existing track surface and subbase, natural turf, underdrains and irrigation.

(3) Architectural work shall consist of construction of pavilion.

(4) Structural work shall consist of concrete slab for pavilion.

(5) Electrical work shall consist of the installation of underground sleeves for future data and fiber cabling, along with the installation of power circuits and convenience receptacles to serve track and timing equipment and scoreboards.

4. LOCATION

a. Work shall be performed under this Contract on the campus of the University of Missouri – Columbia, at Walton Stadium.

5. NUMBER OF CONSTRUCTION DOCUMENTS

a. The Owner's Representative will furnish the Contractor a copy of the executed Contract and a complete set of Drawings and Specifications in PDF format.

b. The contractor may obtain printed sets from the architect at cost of reproduction.

c. The Owner will furnish explanatory and changed Drawings to the Contractor in PDF format as issued during project.

d. The Owner will provide electronic data files to the Contractor for their convenience and use in progressing the Work and the preparation of shop drawings or other submittal requirements required for construction of the reference project. The electronic data files shall reflect Construction Documents and Bid Addenda only. These files will be transmitted subject to the following terms and conditions:

(1) The Owner makes no representation as to the compatibility of these files with the Contractor's hardware or software.

(2) Data contained on these electronic files shall not be used by the Contractor or anyone else for any purpose other than as a convenience in progressing the Work or in the preparation of shop drawings or other required submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at their own sole risk and without liability or legal exposure to Owner. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature

against the Owner and its consultants, contractors, agents, employees, and representatives that may arise out of or in connection with the use of the electronic files transmitted.

(3) Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless the Owner and its consultants, contractors, agents, employees, and representatives, against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

(4) These electronic files are not contract documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. The Owner makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by the Consultant and the electronic files, the signed and sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents.

(5) Because information presented on the electronic files can be modified, unintentionally or otherwise, the Owner reserves the right to remove all indications of ownership and/or involvement from each electronic display.

(6) Under no circumstances shall delivery of the electronic files be deemed a sale by the Owner and no warranties are made, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Owner be liable for any loss of profit, or any consequential damages as a result of use or reuse of these electronic files.

6. SUBMITTALS

a. The Contractor shall submit for approval to the Architect, equipment lists and Shop Drawings, as expediently as possible. Failure of the Contractor to submit Shop Drawings in a timely manner will result in the Owner holding back Contractor payments. (See General Conditions)

b. The material and equipment lists shall be submitted and approved before any material or equipment is purchased and shall be corrected to as-built conditions before the completion of the project.

c. The Contractor shall submit electronic versions of all required Shop Drawings,

material and equipment lists. The Contractor shall upload all Shop Drawings to a secure information sharing website determined by the Owner notifying the Owner and Consultant that these shop drawings are available for review. Each submittal shall have the General Contractors digital stamp affixed to the first page signifying their review and acceptance. Review comments, approvals, and rejections will be posted on this same site with notification to the contractor. Submittals requiring a professional seal shall be submitted hard copy with a manual seal affixed.

(1) The Contractor shall identify each submittal item with the following:
   (a) Project Title and Locations
   (b) Project Number
   (c) Supplier's Name
   (d) Manufacturer's Name
   (e) Contract Specification Section and Article Number
   (f) Contract Drawing Number
   (g) Acrobat File Name: Spec Section_Times Submitted_Spec Title: 033000_01-Cast in Place Concrete.pdf

(2) Reference the accompanying Shop Drawing and Submittal Log at the end of this section (1.E.4) for the required submittal information.

d. The Contractor shall submit to the Architect four (4) bound copies of all required Operating Instructions and Service Manuals for the Architect's and the Owner's sole use prior to completing 50% of the adjusted contract. Payments beyond 50% of the contract amount may be withheld until all Operating Instructions and Service Manuals are received as referenced in the accompanying Operating Instructions and Service Manual Log at the end of this section (1.E.5).

e. The Contractor shall submit to the Owner's Representative all items referenced in the accompanying Closeout Log (1.E.6) within 30 days following substantial completion of the work. The Owner's Representative will maintain the closeout log and include as an agenda item at all coordination meetings.

7. USE OF PREMISES

a. Access: Access to construction site shall be as indicated on the drawings and as directed by the Owner's Representative.

b. Parking:
   (1) The Owner will issue Contractor two (2) service vehicle parking permits for use in University Parking lot RP-8/U, in the South Lot. The permits will be issued at no cost to the contractor up to the contract completion date. After the contract completion date, the permits will be re-issued on an as available basis at the contractors' expense. These permits are to be used for general contractor or subcontractor owned and labeled vehicles only. Personal

vehicles are prohibited from use of these permits. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

(2) Parking Lot RP-8/U is designated as MU Athletics Donor Parking during the 2026 Mizzou Football season. Parking within these lots will not be allowed on a scheduled home game as coordinated with the Owner's Representatives

(3) Parking of personal vehicles within project access/lay down/staging areas is prohibited. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

(4) Parking or driving on sidewalks, landscaped areas, within fire and service lanes or generally in areas not designated for vehicular traffic is prohibited except as allowed in the contract documents. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

(5) Sidewalk(s) and Hardscape – Parking/driving on hardscapes is strictly prohibited unless specifically directed by the Owner's Representative through the MU sidewalk permitting process. Restricted use permits will be limited to activities that are constrained by an absolute need to access from a sidewalk. Such activities shall be considered the exception and not the norm. Adequate signage, fencing and alternate routes must be provided in the immediate and adjacent areas.

(6) Free parking for contractor employees is available in the Ashland Road Contractor lot on an as available basis. This space is for use by contractor employees for parking their personal vehicles only and is not to be used for staging or storage.

(7) Vendor Permits may be purchased by contractor management personnel on an as available basis by contacting the Parking and Transportation office in the General Services Building. These permits will allow contractor management personnel to park in various University lots while conducting business on University construction projects.

(8) Temporary University parking permits may be purchased by contractor employees for use with their personal vehicles on an as available basis by contacting the Parking and Transportation office in the General Services Building.

(9) Conley Avenue between Missouri Avenue and University Avenue and Hitt Street between University Avenue and the Memorial Union are designated for pedestrian use only during the work week between the hours of 8:15 AM and 3:45 PM. Unless otherwise indicated in the contract documents, this area is strictly off limits to vehicular traffic without authorization from the Owner's Representative.

c. Storage of materials: The Contractor shall store all materials within project limits. The Contractor shall confine apparatus, materials, and operation of workers to location established by the Owner's Representative. The Contractor shall not unreasonably encumber premises with materials. In addition, storage trailer locations may be available within 1-1/2 miles of project site as directed by the Owner's Representative. Storage trailer locations shall be subject to approval by the Owner's Representative and are available to the Contractor without cost.

d. Utilities: Drinking water, water required to carry on work, and 120-volt electrical power required for small tool operation may be obtained without cost to the Contractor from existing utilities at locations designated by the Owner's Representative. Provisions for obtaining power, including temporary extensions, shall be furnished, and maintained by the Contractor. Upon completion of work such extensions shall be removed and any damage caused by use of such extensions shall be repaired to satisfaction of the Owner's Representative, at no cost to the Owner.

e. Restroom: The Contractor shall provide and maintain, in a sanitary condition, chemical type portable toilet facilities at work site for use by his personnel. Toilets and toilet location shall be subject to approval by the Owner's Representative.

f. Smoking is prohibited at the University of Missouri and all properties owned, operated, leased or controlled by the University of Missouri. Violation of the policy is defined as the use of any tobacco or marijuana products, including e-cigarettes, cigarettes, and vaping.

g. Care of Project Work Site: The contractor shall be responsible for maintaining the construction site in a reasonably neat and orderly condition by regular cleaning and mowing of the premises as determined by the Owner's Representative.

h. Discharge to Sewer Request: The University of Missouri's MS4 permit and NPDES Storm Water Discharge Permits along with the City of Columbia's POTW Operating Permit as well as local ordinances, and state and federal environmental regulations prohibit hazardous materials from being disposed into either the storm water or sanitary sewer systems. Unless specifically approved, all chemical products such as paints, dyes, lawn care products, maintenance products, and oil ~~is~~ prohibited from drain disposal. Any product, including contaminated water, being discarded into the storm water or sanitary sewer systems requires written approval from the Owner through a formal "Discharge to Sewer Request" form obtained at Discharge to Sewer Request Form. The contractor should submit the form to the

Owner's Representative, not to the Department of Environmental Health and Safety as the form indicates.

i. All concrete waste material including washout water shall be totally contained and removed from the Owner's property.

j. Artifacts Found During Construction: Contractor shall immediately notify the Owner's Representative when artifacts are uncovered or found during the demolition or construction process. Artifacts include, but are not limited to, tools, drawings (construction or other), photographs, books and other objects/devices which may hold historical importance/significance. Do not remove or disturb the object(s) in question. Artifacts are not considered part of demolished materials and shall remain the property of the University of Missouri.

k. <u>"Permit Required Confined Space" Entry Communication and Coordination</u>

(See OSHA 1926 subpart aa – Construction Confined Space for the definition of "permit required confined spaces" - Note: OSHA does not apply to the University. However, the University will provide a list of all known "permit required confined spaces")

There are no known "permit required confined spaces" within the project limits. Each contractor shall conduct a survey to confirm whether or not any confined spaces exist within the project limits. It is incumbent upon each contractor to list all "permit required spaces".

The Contractor shall notify the Owner's Representative if 1) conditions change resulting in a non-permit required confined space being reclassified to a "permit required confined space" after evaluation of the space by a competent person; 2) a space previously thought to be non-permit required space is classified as a "permit required confined space"; or 3) during the course of construction a "permit required confined space" is created after evaluation by a competent person.

The Contractor shall submit to the Owner's Representative a copy of the cancelled confined space entry permit and a written report summarizing the permit space program followed and all hazards confronted or created during entry operations. This information shall be submitted within one week of cancelling the permit.

8 PROTECTION OF OWNER'S PROPERTY

a. The Contractor shall be responsible for repair of damage to building exterior and interior, drives, curbs, streets, walks, grass, shrubbery and trees, which was caused by workmen or equipment employed during progress of work. All such repairs shall be made to satisfaction of the Owner's Representative, at no cost to the Owner, or reimburse the Owner if the Owner elects to make repairs. For landscape damage, the Owners shall make such repairs. Compensation for these repairs shall be determined by the Owner's Representative using the "Valuation of Landscape

Trees, Shrubs, and other Plants" as published by the International Society of Arboriculture, as last revised.

b. Construction Project Fencing:

(1) Fencing requirements, as indicated on Drawings, shall be constructed of 9 or 11-gauge chain link not less than six (6) feet in height and not more than 2-inch mesh with posts spaced not more than ten (10) feet apart and all corner and gate posts imbedded in concrete. All other posts shall be sufficiently secured in ground to maintain proper and adequate support of fence. Fenced in area shall have at least two (2) access gates and all gates shall be lockable.

(2) Fence screening fabric shall be used on all perimeter fencing. Fabric shall be tiger striped in color, full height of the project fence, securely attached and properly maintained throughout the duration of the project.

(3) Project worksite shall be kept continuously protected with, at minimum, a temporary portable fence constructed of woven wire or plastic woven fencing not less than five (5) feet in height and supported by metal tee posts spaced not more than ten (10) feet apart and imbedded in five (5) gallon buckets of concrete or an equivalent method of support. In lieu of five-gallon buckets of concrete, metal posts may be driven into ground or asphalt. Fencing shall have reflective devices, such as, tape, ribbon, and/or be painted in a bright fluorescent color. Portions of fence shall be reinstalled when work activities cease and during all non-work periods.

(4) Using existing landmarks, lamp posts, trees or other Owner property for support of fencing is strictly prohibited unless a written waiver is obtained from Owner's Representative.

(5) Use of ribbon, snow fence, chicken wire, rope, and wooden barricades as fencing is prohibited.

(6) Fencing shall be maintained in an "as-installed" condition throughout the life of the project.

(7) The Contractor may use used fencing provided it is in good condition and is satisfactory to the Owner's Representative.

c. Preserving and Protecting Existing Vegetation:

(1) Protection and compensation for damages:

(a) Trees and shrubs within work area designated to remain shall be protected from damage during construction by fixed chain link

fencing or armoring as indicated on Drawings or specified herein.

Plant protection devices shall be installed before work has begun and shall be maintained for duration of work unless otherwise directed by Owner's Representative.

(b) In the event that damage(s) to the Owner's trees, shrubs or vegetation occurs as a result of the Contractor's unauthorized operations, the Contractor shall pay or allow to the Owner compensation for said damage(s). Compensation shall be determined by the Owner's Representative using the "Valuation of Landscape Trees, Shrubs, and other Plants" as published by the International Society of Arboriculture, as last revised.

(2) To prevent compaction of soil over tree roots, vehicles or equipment shall not at any time park or travel over, nor shall any materials be stored within drip line of trees designated to remain.

(3) Owner's Representative will stop work immediately when proper measures are not being employed to protect trees and shrubs. Contractor will be notified to resume work after required protection measures are implemented.

(4) Removal and/or pruning of select landscape materials shall be performed by MU Landscape Services department.

9. SUBSTITUTIONS AND EQUALS

a. Substitutions and equals are defined in Article 3 of the General Conditions.

b. If the Architect and Owner approve a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approval made in any other manner.

10. CODES AND STANDARDS

a. The Contractor shall comply with applicable codes and standards as listed in the General Conditions.

11. PERMITS

a. The Owner will secure and pay for specific necessary approvals, easements, assessments, and charges required for construction, use or occupancy of permanent structures, or for permanent changes in existing facilities except as noted in Article 3.2 of the General Conditions.

b. Before commencement of Boilers, Water Heaters or Pressure Vessels the Contractor

must obtain an installation permit from the State of Missouri, Division of Fire Safety, Boiler and Pressure Unit as required by 11 CSR 40-2.010 through 11 CSR 30-2.065. Ther permit applications are available at https://dfs.dps.mo.gov/programs/bpv/.

12. SPECIALTIES

a. Owner furnished topsoil: The Owner will place the topsoil and provide final grade. The contractor shall rough grade to the following specifications:

(1) The sub-grade is to be left at minus six inches (6") in all areas unless indicated otherwise. All planting bed sub-grades are to be left a minus eighteen inches (18"). The contractor is to remove all deleterious material from the sub-grade prior to placing topsoil. All subgrade areas shall contain at least 6" of subsoil, (ie. cover clean rock backfilled areas). All subgrade areas shall be "ripped" a minimum of 6" deep and a maximum of 12" apart in opposite directions with minimal tire traffic to follow. All exposed deleterious material and unacceptable rock shall be removed.

(2) The contractor shall adjust all yard boxes valve boxes, pull boxes, cleanouts, and manhole lid rings etc. (includes irrigation, sewers, water and electric), to the indicated finish grade.

(3) Final plantings will be by the Owner. The Owner will water and maintain all seed, sod and landscaping.

b. Irrigation System: On new irrigation systems, only Hunter, Toro or Rain Bird products are to be considered.

13. PRE-BID INSPECTION

a. All pre-bid inspections of work areas shall be scheduled with pre-bid inspection guide, telephone: (573) 882-6800

14. ROOF CERTIFICATION AND WARRANTY REQUIREMENT

a. The Contractor shall submit a copy of the University of Missouri Roof System Manufacturer's Certification for each proposed roofing system, within two business days following receipt of bids by the Owner. The Certification shall be submitted to the Owner and the Architect of Record and shall be manually signed by an authorized representative of Manufacturer of each proposed roofing system. Certification shall have original signature.

b. The Contractor shall submit a sample copy of the Roof Manufacturer's Warranty for each proposed roofing system, within two (2) business days following receipt of bids by the Owner, clearly labeled as "SAMPLE". The sample warranty(s) shall be submitted to the Owner and the Architect of Record.

c. The Owner and Architect of Record will review both documents for compliance with the Contract Documents and will notify the Contractor with required modifications.

d. Within two weeks following final inspection and acceptance of the roofing system(s) by the Owner and the roofing system manufacturer(s), the Contractor shall submit a manually signed standard warranty agreement, in the same form as the sample, provided and executed by the roofing system manufacturer for each roofing system provided. Standard warranty agreement(s) shall be of the duration specified in Division 7.

e. University of Missouri three (3) year Contractor's Roofing/Flashing/Sheetmetal Guarantee shall be signed by the roofing contractor after final inspection and acceptance of each roofing system by Manufacturer and by Owner.

15. MODIFICATIONS TO GENERAL CONDITIONS

a. General Conditions

(1) Reference: General Conditions Article 11.2.1 Commercial General Liability.

(a) DELETE in the first sentence of 11.2.1: $2,000,000 per occurrence, $5,000,000 in general aggregate, $5,000,000 products and completed operations aggregate and $1,000,000 personal injury and advertising injury." INSERT "$2,000,000 per occurrence, $10,000,000 in general aggregate, $10,000,000 products and completed operations aggregate and $1,000,000 personal injury and advertising injury."

16. PROJECT SCHEDULING

a. Contractor Schedule – Contractor is responsible for the schedule, that may be provided with in-house personnel or hired a third-party scheduling consultant. See Contractor Schedule Requirements included in these documents.

b. Contractor Schedule Requirements

(1) GENERAL

(a) Time is of the essence for this contract. The time frames spelled out in this contract are essential to the success of this project. The University understands that effective schedule management, in accordance with the General Conditions and these Special Conditions is necessary to insure to that the critical milestone and end dates spelled out in the contract are achieved.

(b) Related Documents

(i) Drawings and general provisions of the Contract, including General Conditions' Article 3.18 shall apply to this Section.

(c) Stakeholders

(i) A Stake holder is anyone with a stake in the outcome of the Project, including the University, the University Department utilizing the facility, the Design Professionals, the Contractor and Subcontractor(s).

(d) Weather

(i) Contractor acknowledges that there will be days in which work cannot be completed on weather sensitive activities, due to the weather, and that a certain number of these lost days are to be expected under normal weather conditions in Missouri.

(ii) Rather than speculate as to what comprises "normal" weather at the location of the project, Contractor agrees that it will assume a total of 44 lost days, on weather sensitive activities of critical path work, due to weather over the course of a calendar year and include same in its as planned schedule. For projects of less than a calendar year, lost weather days should be prorated for the months of construction in accordance with the following schedule.

(iii) Anticipated weather days for allocation/proration only. For projects lasting 12 months or longer, the 44 days per year plus whatever additional months are included will constitute normal weather.

Jan – 5 days	Feb – 5 days	Mar – 4 days	Apr – 4 days
May – 3 days	Jun – 3 days	Jul – 2 days	Aug – 2 days
Sep – 3 days	Oct – 4 days	Nov – 4 days	Dec – 5 days

(iv) The Contractor shall notify the Owner's Representative via email on the same day a lost weather day occurs and shall maintain a log of weather days to be included in the Narrative described in 2.3.4 herein.

(2) SCHEDULING PROCESS

(a) The intent of this section is to ensure that a well-conceived plan, that addresses the milestone and completion dates spelled out in these documents, is developed with input from all stakeholders in the project. Input is limited to all reasonable requests that are consistent with the requirements of the contract documents, and do not prejudice the Contractor's ability to perform its work consistent with the contract documents. Further, the plan must be documented in an understandable format that allows for each stakeholder in the project to understand the plan for the construction and/or renovation contained in the Project.

(b) Contractor Requirements

(i) Schedule Development

Contractor shall prepare the Project Schedule using the latest version of Phoenix Project Management scheduling software or other software as approved by the Owner's Representative prior to receipt of bids.

Contractor shall review each major subcontractor's schedule with the sub and obtain the subcontractor's concurrence with the schedule, prior to submitting to the University.

(ii) Schedule Updates

1. Schedule Updates will be conducted once a month, at a minimum. Actual Start and Finish dates should be recorded regularly during the month. Remaining Duration shall be updated as of the data date, just prior to Contractor's submittal of the updated data.

2. Contractor will copy the previous months schedule and will input update information into the new monthly update version.

3. Contractor will meet with the Owner's Representative to review the draft of the updated schedule. At this meeting, Owner's Representative and Contractor will:

(a) Review out of sequence progress, making adjustments as necessary.

(b) Add any fragnets necessary to describe changes or other impacts to the project schedule and

(c) Review the resultant critical and near critical paths to determine any impact of the occurrences encountered over the last month.

(iii)Schedule Narrative

After finalization of the update, the Contractor will prepare a Narrative that describes progress for the month, impacts to the schedule and an assessment as to the Contractor's entitlement to a time extension for occurrences beyond its control during the month and submit in accordance with this Section.

(c) Progress Meetings

(i) Review the updated schedule at each monthly progress meeting. Payments to the Contractor may be suspended if the progress schedule is not adequately updated to reflect actual conditions.

(ii) Submit progress schedules to subcontractors to permit coordinating their progress schedules to the general construction work. Include four (4) weeks look ahead schedules to allow subs to focus on critical upcoming work.

(2) CRITICAL PATH METHOD (CPM)

(a) This Section includes administrative and procedural requirements for the critical pay method (CPM) of scheduling and reporting progress of the Work.

(b) Refer to the General and Special Conditions and the Agreement for definitions and specific dates of Contract Time.

(c) Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.

(d) Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.

(e) Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.

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

(g) Critical activities are activities on the critical path.

(h) Predecessor activity is an activity that must be completed before a given activity can be started.

(i) Milestone: A key or critical point in time for reference or measurement.

(j) Float or Slack Time: The measure of leeway in activity performance. Accumulative float time is not for the exclusive use or benefit of the Owner or Contractor but is a project resource available to both parties as needed to meet contract milestones and the completion date.

(k) Total float is herein defined as the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

(l) Weather: Adverse weather that is normal for the area must be taken into account in the Contractor's Project Schedule. See 1.(d)(iii), above.

(m) Force Majeure Event: Any event that delays the project but is beyond the control and/or contractual responsibility of either party.

(n) Schedule shall include the following, in addition to Contractor's work.

(i) Phasing: Provide activity codes in the schedule to show how the sequence of the Work is affected by the following:

1. Requirements for phased completion and milestone dates.
2. Work by separate contractors.
3. Work by the Owner
4. Coordination with existing construction.
5. Limitations of continued occupancies.
6. Uninterruptible services.
7. Partial occupancy prior to Substantial Completion.

8. Area Separations: Use Activity Codes to identify each major area of construction for each major portion of the Work. For the purposed of the Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.
9. Required delivery dates for Owner furnished equipment, if applicable
10. Post substantial completion activities and closeout
11. Floor or Level: Use separate activity codes to identify each floor or level.
12. Subcontractor: Use Activity Codes to identify each subcontractor's work activities.
13. Type Work or Craft: Use Activity Codes to identify the type of work, or craft that will execute each activity.

(4) TIME EXTENSION REQUEST

(a) Refer to General Conditions of the Contract for Construction, Article 4.7 Claims for Additional Time.

(b) Changes or Other Impacts to the Contractor's Work Plan. The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment. The Update must include:

(i) An activity depicting the event(s) impacting the Contractors work plan shall be added to the CPM schedule, using the actual start date of the impact, along with actually required predecessors and successors.

(ii) After the addition of the impact activity(ies), the Contractor will identify subsequent activities on the critical path, with finish to start relationships that can be realistically adjusted to overlap using good, standard construction practice.

1. If the adjustments above result in a completion date beyond the contract completion date, the delay shall be deemed excusable, and the contract completion date shall be extended by the number of days indicated by the analysis.
2. Contractor agrees to continue to utilize its best efforts to make up the time caused by the delays. However, the Contractor is not expected to expend costs not contemplated in its contract, in making those efforts.

(c) Questions of compensability of any delays shall be held until the actual completion of the project. If the actual substantial completion date of the project based on excusable delays, excluding allocated weather delays, exceeds the original contract completion date, AND there are no delays that are the responsibility of the contractor to consider, the delays days may be considered for equitable adjustment. In review of time extension requests for compensable days, the Owner will consider the actual number of weather days incurred.

(d) Home office expenditures and staff are NOT compensable.

17. WARRANTY WALKTHROUGH

a. Contractor shall attend a walk-thru with the Owner at eleven (11) months after acceptance to review and document any warranty items to be addressed as part of the twelve (12) month warranty stated in article 3.1 of the General Conditions.

END OF SECTION

SECTION 1.E.1

UNIVERSITY OF MISSOURI
ROOF SYSTEM MANUFACTURER CERTIFICATION
(Revised 06/24)

TO: _____

Title: Walton Stadium Track and Soccer Surface Upgrade

Project No. CP251272
Location: 1210 Carrie Frankie Drive
Columbia, MO 65203

Our technical staff has examined the Architect/Engineer's Drawings, Specifications and required warranty for the roofing work on this project. We do not wholly endorse the building design or any materials or services not part of our advertised roofing system.

CERTIFICATION

We hereby certify that:

1. All materials we will furnish and deliver to the project shall be of good merchantable quality, shall meet or exceed the Specifications required and shall, if properly applied by one of our approved roofing applicator firms in accord with our instructions, provide a sound weather/watertight roofing system.
2. Upon completion of the installation in accord with the Drawings and specifications and our recommended installation procedures, we shall issue a total system warranty specified in the project Specifications.
3. The Drawings and Specifications follow the recommendations of our roofing manual for this type of roofing system with:

   No exceptions.

   The following exceptions: (The roofing system will be approved for this project if the following changes are made to the Contract Documents. The bid provided with this Document includes the required changes).

   NOTE: Exceptions may cause Owner to reject bid.
   Exceptions are as follows:

_____
_____
_____
_____

4. The Warranty will be issued for the following proposed roofing system:

_____
_____
_____

ROOFING SYSTEM MANUFACTURER: _____

Authorized Signature: _____

Title: _____ Date _____

Telephone Number: ( )

Fax Number: ( ) _____

SECTION 1.E.2

UNIVERSITY OF MISSOURI
CONTRACTOR'S ROOFING/FLASHING/SHEET METAL GUARANTEE
(Revised 06/24)

WHEREAS _____
herein referred to as Roofing Contractor, certify that they have furnished and installed all roofing, flashing, sheet metal and related components in accordance with the Contract Documents and as required by the Roofing System Manufacturer=s installation instructions on the facility described below:

Facility: _____

Owner: University of Missouri-Columbia
Curators of the University of Missouri
1210 Carrie Franke Drive
Columbia, MO 65203

Date of Full Completion: _____

Approximate Area of Roof: _____

Type of Roofing Material: _____

Manufacturer's Specification Number: _____

Thickness and Type of Roof Insulation: _____

NOW, THEREFORE, Roofing Contractor guaranties to the Owner, subject only to the exclusions stated hereinafter, that all roofing, flashing and sheetmetal work is fully and integrally watertight and is free from faults and defects in material or workmanship, and is guaranteed for a period of three (3) years from date of full completion of work.

EXCLUSIONS: This guarantee does not cover, and Roofing Contractor shall not be liable for the following:

1. Damage to the roofing system caused by fire, lightning, tornado, hurricane or hailstorm.

2. Damage to roofing system caused by significant settlement, distortion or failure of roof deck, walls, or foundations of building, excepting normal building expansion and contraction is not a part of this exclusion.

3. Abuse by the Owner and/or third parties.

REPAIRS: Owner shall promptly notify Roofing Contractor, in writing, of the need for repair of roofing, flashing, or sheet metal:

1. Roofing Contractor, within eight (8) hours after receipt of such notice, shall make emergency repairs at its expense, as required to render the facility watertight.

2. Within five (5) days after receipt of such notice, Roofing Contractor shall at its expense correct any faults or defects in material or workmanship.

3. Should needed repairs not be covered by this guarantee, Roofing Contractor, after having obtained Owner's written consent, shall make such repairs at Owner's expense. Following said repairs, this guarantee shall thereafter remain in effect for the unexpired portion of the original term. If Owner does not so consent or

repairs are made by others than the Roofing Contractor, this guarantee shall terminate for those parts of the roof affected by the repair.

4. In the event that Owner has notified the Roofing Contractor of the need for repairs and (i) Roofing Contractor does not immediately make repairs, or (ii) Roofing Contractor disclaims responsibility for the repairs and Owner disagrees, or (iii) Owner considers Roofing Contractor=s quoted cost for repairs not covered by this guarantee to be unreasonable and, an emergency condition exists which requires prompt repair to avoid substantial damage or loss to Owner, then, Owner may make such temporary repairs as he finds necessary and such action shall not be a breach of the provisions of this guarantee.

ANNUAL INSPECTIONS: Roofing Contractor shall inspect roof installation prior to each of the three anniversary dates from date of full completion of the work.

1. Inspection team to include Roofing Contractor, Roof Manufacturer, and Owner=s Representative.

2. Inspection of total roof system will be included in the annual inspections.

3. All defects in total roof system will be corrected by the Roofing Contractor within 30 days of inspection.

4. Roof manufacturer will certify by a written report that roof inspection has been completed, defects are acknowledged, and will warrant any repairs.

5. All corrective work completed by Roofing Contractor shall be warranted as approved by the Roofing Manufacturer.

ROOF MODIFICATION: Should Owner require work to be done on roof of said facility including modifications, alternations, extensions or additions to roof and including installation of vents, platforms, equipment, bracings or fastenings, Owner shall notify Roofing Contractor and give Roofing Contractor an opportunity to make recommendations as to methods necessary to safeguard against damage to roofing covered by this guarantee. Failure of Owner to give Roofing Contractor such opportunity or failure to follow methods recommended by Roofing Contractor shall render this guarantee null and void to the extent such failure should result in damage to roofing covered by this guarantee.

NOTICES: Notification of Roofing Contractor by Owner, shall be fulfilled by sending notice to Roofing Contractor.

IN WITNESS WHEREOF, we set our hands this _____ day of _____, 20___.

By:_____

Title:_____

For Roofing Contractor

Name:_____

Address:_____

Phone:_____

SECTION 1.E.3

SHOP DRAWING AND SUBMITTAL LOG

Project: Walton Stadium Track and Soccer Surface Upgrade
Project Number: CP251272
Contractor:

Section	*Description*	*Contractor*	*Date Received*	*Date Returned*	*Comments*
03 3000	Concrete Mix Submittals				
03 3000	Concrete Reinforcing Shop Drawings				
26 0519	Conductors, cables, and wiring connectors				
26 0526	Conductors and connectors				
26 0533.13	Conduits and conduit fittings				
26 2200	Transformer				
26 2416	Electric Panel Board				
26 2726	Receptacles				
31 2001	Soil Stabilization				
32 1313	Asphalt Paving				
32 1313	Concrete Paving				
32 1373	Concrete Paving Joint Sealants				
32 2910	Test reports, product data, drainage system including layout and connections, irrigation system, track and field equipment				
32 2910	Material Certifications				
32 2910	Water Quality Report				
32 2910	Samples of playing field sand material, gravel drainage material and sod				
32 2910	Supplier list				

SECTION 1.E.3

SHOP DRAWING AND SUBMITTAL LOG

Project: Walton Stadium Track and Soccer Surface Upgrade
Project Number: CP251272
Contractor:

Section	***Description***	***Contractor***	***Discipline Responsible***	***Date Received***	***Date Returned***	***Comments***
32 8400	Materials list					
32 8400	Drawings of full system design with zone table with water calculations and installation details					
32 1373	Concrete Paving Joint Sealants					
32 3113	Chain Link Fence and Gates					
33 1113	Water Distribution Piping					
33 4100	Storm Utility Piping					
33 4600	Subdrainage					

SECTION 1.E.4

OPERATING INSTRUCTIONS AND SERVICE MANUAL LOG

Project: Walton Stadium Track and Soccer Surface Upgrade
Project Number: CP251272
Contractor:

Section	Description	Catalog Data	Wiring Diagrams	Installation Instructions	Service & Maintenance Instructions	Parts List & Availability	Performance Curves	Startup & Operating Instructions
32 8400	Irrigation System							

SECTION 1.E.5

CLOSEOUT LOG

Project: Walton Stadium Track and Soccer Surface Upgrade
Project Number: CP251272
Contractor:

Section	***Description***	***Contractor / Subcontractor***	***Date Rec'd***	***# of Copies***	***CPM Initials***	***Remarks***
GC / 3.11	As-built drawings					
GC/13.5.6	Final Affidavit of MBE/WBE/SDVE Participation for each MBE/WBE/SDVE Firm					
SC/20	List special warranties and guarantees for each section					
	List any required maintenance stock, spare parts, etc.					
	List any special tools, keys, etc.					

SECTION 1.F

INDEX OF DRAWINGS

Drawings referred to in and accompanying this Project Manual consist of the following sheets dated September 8, 2025.

Civil

CE 0.0 – Cover Sheet
CE 1.0 – Existing Conditions
CE 2.0 – Demolition Plan and Initial Erosion Control Plan
CE 2.1 – Site Access Plan
CE 3.0 – Grading Plan and Erosion Control Plan
CE 4.0 – Utility Plan
CE 5.0 – Storm Sewer Profiles and Details
CE 6.0 – Site Plan
CE 6.1 – Enlarged Jumping Events Site Plan
CE 7.0 – Track Details
CE 7.1 – Track Details Continued
CE 7.2 – Site Construction Details
CE 7.3 – Chain Link Fence Details
PF 3.1 – Playing Field Irrigation Plan
EP101 – Power Plan
EP501 – Electrical Details and Schedules
S100 – Cover / General Structural Data
S200 – Foundation Plans & Details
CE 8.0 – Alternate #1 – Soccer Practice Field
PF 3.2 – Practice Playing Field Irrigation Plan – Alternate #1
CE 8.1 – Alternate #2 – Sand Pit

END OF SECTION

SECTION 1.G

PREVAILING WAGE RATES

1. The prevailing wage rates for Boone County as issued by the Missouri Division of Labor on the following pages.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 32

Section 010
BOONE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2025**

Last Date Objections May Be Filed: **April 9, 2025**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$61.64
Boilermaker	$34.21*
Bricklayer-Stone Mason	$57.33
Carpenter	$54.00
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$47.94
Plasterer	
Communication Technician	$60.91
Electrician (Inside Wireman)	$60.73
Electrician Outside Lineman	$83.75
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$34.21*
Glazier	$57.72
Ironworker	**$72.58**
Laborer	$45.36
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$63.31
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$67.29
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$43.55
Plumber	$72.49
Pipe Fitter	
Roofer	$56.44
Sheet Metal Worker	$58.82
Sprinkler Fitter	$69.16
Truck Driver	$34.21*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.
**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.

Heavy Construction Rates for
BOONE County

Section 010

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$67.38
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$83.75
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$53.59
General Laborer	
Skilled Laborer	
Operating Engineer	$69.61
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$34.21*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 1.H

ALTERNATES

Base Bid may be increased in accordance with following Additive Alternate proposal(s) as Owner may elect:

1. Additive Alternate No. 1:

   Soccer Practice field removal and replacement of underdrains, irrigation and turf.

2. Additive Alternate No. 2:

   Sand Pit at northeast corner of track area.

SECTION 1.I

UNIVERSITY OF MISSOURI HOT WORK PERMIT

University of Missouri
HOT WORK PERMIT

Seek an alternative/safer method if possible

Before initiating hot work, ensure precautions are in place as required by NFPA 51B and ANSI Z49.1.
Make sure an appropriate fire extinguisher is readily available.

This Hot Work Permit is required for any operation involving open flame or producing heat and/or sparks. This work includes, but is not limited to, welding, brazing, cutting, grinding, soldering, thawing pipe, torch applied roofing, or chemical welding.

Date	Hot Work by: Employee ☐ Contractor ☐
Location / Building / Floor / Room #:	Name (Print) and Signature of person doing Hot Work
Work to be performed:	I verify that the above location has been examined, the precautions marked on the checklist below have been taken, and permission is granted for this work.
Time Started _____ Time Completed _____	Name (print) and signature of permit-authorizing individual (PAI)
Time Fire Watch Completed _____	Name (print) and signature of person performing Fire Watch
THIS PERMIT IS GOOD FOR ONE DAY ONLY	

Yes	N/A	
☐	☐	Available sprinklers, hose streams, and extinguishers are in service and operable.
☐	☐	Hot Work equipment is in good working condition in accordance with manufacturer's specifications.
☐	☐	Special permission obtained to conduct hot work on metal vessels or piping lined with rubber or plastic.
Requirements within 35 ft (11 m) of hot work		
☐	☐	Flammable liquid, dust, lint and oily deposits removed.
☐	☐	Explosive atmosphere in area eliminated.
☐	☐	Floors swept clean and trash removed.
☐	☐	Combustible floors wet down or covered with damp sand or fire-resistive / noncombustible materials or equivalent.
☐	☐	Personnel protected from electrical shock when floors are wet.
☐	☐	Other combustible storage material removed or covered with listed or approved materials (welding pads, blankets, curtains, fire-resistive tarpaulins), metal shields, or non-combustible material.
☐	☐	All wall and floor openings are covered.
☐	☐	Ducts and conveyors that might carry sparks to distant combustible material are covered, protected, or shut down.
Requirements for hot work on walls, ceilings or roofs		
☐	☐	Construction is noncombustible and without combustible coverings or insulation.
☐	☐	Combustible material on other side of walls, ceilings, or roofs is moved away.

See Page 2

Yes	N/A	

Requirements for hot work on enclosed equipment

☐	☐	Enclosed equipment is cleaned of all combustibles.
☐	☐	Containers are purged of flammable liquid / vapor.
☐	☐	Pressurized vessels, piping, and equipment removed from service, isolated, and vented.

Requirements for hot work fire watch and fire monitoring

☐	☐	Fire watch is provided with suitable extinguishers and, where practical, a charged fire hose.
☐	☐	Fire watch is trained in use of equipment, sounding alarm, and notification of emergency contacts.
☐	☐	Fire watch is required in adjoining areas, or above and below the work area.
☐	☐	Per the PAI / fire watch, monitoring of hot work area is required, per the table below.

Construction Factors

	Noncombustible construction		Combustible construction without concealed cavities		Combustible Construction with unprotected concealed cavities	
Occupancy Factors	Fire Watch	Monitor	Fire Watch	Monitor	Fire Watch	Monitor
Noncombustible with any combustibles contained within closed equipment (e.g., ignitable liquid within piping)	30 minutes	0 hours	1 hour	3 hours	1 hour	5 hours
Office, retail or manufacturing with limited combustible loading	1 hour	1 hour	1 hour	3 hours	1 hour	5 hours

POST A COPY OF THIS PERMIT IN/NEAR THE HOT WORK AREA.

Admin: University employees shall file hot work permits in departmental safety file records.

Contract personnel shall file copies of permits in the University of Missouri Project Management File System.

END OF SECTION

SECTION 03 3000 CAST-IN-PLACE CONCRETE
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that 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. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

C. Moisture Vapor Reduction Admixture Warranty

1. Manufacturer’s Warranty: Submit, for the owner’s acceptance, the manufacturer’s standard warranty document executed by an authorized company official. The manufacturer’s warranty is in addition to, and not a limitation of, other rights the Owner may have under provisions of the contract documents.
2. Warranty Period: Ten years commencing on the date of acceptance of the project by the Owner or Notice of Completion whichever is earliest.
    a. Warranty Terms: Terms to include moisture related failures, including all interior finish floor materials and labor. Admixture warranty issued on completion of ASTM-D-5084 or ASTM-D-4263 test and results submitted to a Systems Representative.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

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

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150 Type I/II, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/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.

7. Moisture Vapor Reduction Admixture (Interior Slabs):

   a. Acceptable Products:
      1) Concure Systems
      2) Barrier One
      3) Vapor Lock 20/20

2.5 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.7 CURING MATERIALS

A. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.8 EXTERIOR CONCRETE SEALERS

A. Clear, Waterbased Silane-silxane penetrating sealer. Two coats for improving resistance to freeze-thaw.

1. SikaCem -102 First Seal or approved equal

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.10 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 20 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.

D. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As required by prints at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.50 – footings; 0.45 – all other mixes

3. Slump Limit: 4 inches (125 mm) or 8 inches (200 mm for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).

4. Air Content: 6 percent plus or minus 1.5 percent for exterior concrete. Do not allow air content of trowel-finished floors to exceed 3 percent.

5. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

a. Add water vapor reducing admixture per manufacturers specified dosage rate to ready mix truck at the batch plant, or jobsite before discharge, mix rapidly for 7 minutes. (Follow Manufacturer’s Instructions).

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

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

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

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

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

3.5 JOINTS

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

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

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

E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

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

1. Apply to concrete surfaces exposed to public view.

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

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

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

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4" (6.4mm).

C. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

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

D.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m 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. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

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

D. Sealer

1. Apply two coats of sealer to exterior concrete.

3.10 CONCRETE SURFACE REPAIRS

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

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 03 3000

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Underground feeder and branch-circuit cable.

C. Wiring connectors.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.

3. Notify engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

2. PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

H. Conductor Color Coding:

1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
3. Color Code:
   a. 208Y/120 V, 3 Phase, 4 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
      4) Neutral/Grounded: White.
   b. Equipment Ground, All Systems: Green.

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:

1. Feeders and Branch Circuits:
   a. Size 10 AWG and Smaller: Solid.
   b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:

1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
   a. Installed Underground: Type XHHW-2.

2.4 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

A. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.

B. Provide equipment grounding conductor unless otherwise indicated.

C. Conductor Stranding:

1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

2.5 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Circuiting Requirements:

1. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated without specific routing, determine exact routing required.
3. Arrange circuiting to minimize splices.
4. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.

E. Installation in Raceway:

1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
2. Pull all conductors and cables together into raceway at same time.
3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

H. Terminate cables using suitable fittings.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.2 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 56 00 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

2. PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Separately Derived System Grounding:

1. Separately derived systems include, but are not limited to:
   a. Transformers (except autotransformers such as buck-boost transformers).
2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
4. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor

connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.

5. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

E. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:

1. Use insulated copper conductors unless otherwise indicated.

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
4. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 05 53.

END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum rigid metal conduit (RMC).
B. Rigid polyvinyl chloride (PVC) conduit.
C. Conduit fittings.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
B. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.
C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

2. PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the

most restrictive requirements. Where conduit type for a particular application is not specified rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use rigid PVC conduit.
   2. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.

D. Exposed, Exterior: Use aluminum rigid metal conduit.

2.2 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 ALUMINUM RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use aluminum.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.5 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage amd where emerging through concrete; rated for use with conductors rated 90 degrees C.

B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.

D. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

E. Conduit Routing:

1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated without specific routing, determine exact routing required.
3. Arrange conduit to maintain adequate headroom, clearances, and access.
4. Route conduits above water and drain piping where possible.
5. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.

F. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

G. Underground Installation:

1. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Under Slab on Grade: 12 inches to bottom of slab.
2. Provide underground warning tape

H. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

I. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

J. Provide grounding and bonding in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

3.4 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

SECTION 26 05 73
POWER SYSTEM STUDIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-circuit study.

B. Protective device coordination study.

C. Arc flash and shock risk assessment.

1. Includes arc flash hazard warning labels.

D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.2 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Existing Installations: Coordinate with equipment manufacturer(s) to obtain data necessary for completion of studies.

2. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.

B. Sequencing:

1. Submit study reports prior to or concurrent with product submittals.

2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.4 SUBMITTALS

A. Study reports, stamped or sealed and signed by study preparer.

B. Arc Flash Hazard Warning Label Samples: One of each type and legend specified.

C. Site-specific arc flash hazard warning labels.

D. Project Record Documents: Revise studies as required to reflect as-built conditions.

1. Include hard copies with operation and maintenance data submittals.

2. Include computer software files used to prepare studies with file name(s) cross-referenced to specific pieces of equipment and systems.

1.5 POWER SYSTEM STUDIES

A. Scope of Studies:

1. Perform analysis of both new and existing portions of electrical distribution system as indicated on drawings.

2. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).

B. General Study Requirements:

1. Comply with NFPA 70.

2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.

C. Data Collection:
   1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
      a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
         1) Obtain up-to-date information from Utility Company.
      b. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 00001 code letter designation.
      c. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
      d. Protective Devices:
         1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
         2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
      e. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
      f. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.
   2. Existing Installations:
      a. Collect data on existing electrical distribution system necessary for completion of studies, including field verification of available existing data (e.g. construction documents, previous studies). Include actual settings for field-adjustable devices.

D. Short-Circuit Study:
   1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
   2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
      a. Maximum utility fault currents.
      b. Maximum motor contribution.
      c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
   3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.

E. Arc Flash and Shock Risk Assessment:

1. Comply with NFPA 70E.
2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
3. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
    a. Maximum and minimum utility fault currents.
    b. Maximum and minimum motor contribution.
    c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).

F. Study Reports:
1. General Requirements:
    a. Identify date of study and study preparer.
    b. Identify study methodology and software product(s) used.
    c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
    d. Identify base used for per unit values.
    e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
    f. Include conclusions and recommendations.
2. Short-Circuit Study:
    a. For each scenario, identify at each bus location:
        1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
        2) Fault point X/R ratio.
        3) Associated equipment short circuit current ratings.
    b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
3. Protective Device Coordination Study:
    a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
    b. For each graph include (where applicable):
        1) Partial single-line diagram identifying the portion of the system illustrated.
        2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
        3) Conductors: Damage curves.
        4) Transformers: Inrush points and damage curves.
        5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
        6) Motors: Full load current, starting curves, and damage curves.
        7) Capacitors: Full load current and damage curves.

c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
    1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
    2) Include ground fault pickup and delay.
    3) Include fuse ratings.
    4) Protective Relays: Include current/potential transformer ratios, tap, time dial, and instantaneous pickup.
d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.

4. Arc Flash and Shock Risk Assessment:
    a. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.

1.6 QUALITY ASSURANCE

A. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

2. PART 2 PRODUCTS

2.1 ARC FLASH HAZARD WARNING LABELS

A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
    1. Materials: Comply with Section 26 05 53.
    2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
        a. Include the following information:
            1) Arc flash boundary.
            2) Available incident energy and corresponding working distance.
            3) Nominal system voltage.

3. PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Adjust equipment and protective devices for compliance with studies and recommended settings.

B. Notify Architect of any conflicts with or deviations from studies. Obtain direction before proceeding.

END OF SECTION

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. K-factor transformers rated for nonlinear loads.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

1.3 REFERENCE STANDARDS

A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.

B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.

E. NEMA ST 20 - Dry Type Transformers for General Applications; 2021.

F. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

1. K-factor Rated Transformers: Include K-factor ratings.

1.5 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

2. PART 2 PRODUCTS

2.1 K-FACTOR TRANSFORMERS RATED FOR NONLINEAR LOADS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 1561, and designed to supply nonlinear loads to the degree designated by the UL defined K-factor; ratings as indicated on the drawings.

B. Primary Voltage: 480 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. K-factor Rating: K-4, or higher.

E. Insulation System and Allowable Average Winding Temperature Rise: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

F. Coil Conductors: Continuous aluminum windings with terminations brazed or welded. Individually insulate secondary conductors and arrange to minimize hysteresis and eddy

current losses at harmonic frequencies. Size secondary neutral conductor at twice the secondary phase conductor ampacity.

G. Winding Taps: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

H. Neutral Bus: Sized to accommodate twice the rated secondary current.

I. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

J. Sound Levels: Standard sound levels complying with NEMA ST 20

K. Mounting Provisions:

1. Up to 75 kVA: Suitable for wall, floor, or trapeze mounting.
2. Larger than 75 kVA: Suitable for floor mounting.

L. Transformer Enclosure: Comply with NEMA ST 20.

1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
   a. Outdoor locations: Type 3R.
2. Construction: Steel, ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

E. Install transformers plumb and level.

F. Provide grounding and bonding in accordance with Section 26 05 26.

G. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

H. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

3.2 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.3 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Lighting and appliance panelboards.

B. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NEMA PB 1 - Panelboards; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Panelboard Keys: Two of each different key.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS but not limtied to.

A. ABB/GE; _____: www.geindustrial.com/#sle.

B. Eaton Corporation: www.eaton.com/#sle.

C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

D. Siemens Industry, Inc: www.usa.siemens.com/#sle.

2.2 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet.

2. Ambient Temperature:

C. Short Circuit Current Rating:

1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide fully rated neutral bus, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:

a. Outdoor Locations: Type 3R.

2. Boxes: Galvanized steel unless otherwise indicated.

a. Provide wiring gutters sized to accommodate the conductors to be installed.

3. Fronts:

a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.3 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only .
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Copper.
   3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted enclosures as indicated.
   2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Provide mechanical lugs unless otherwise indicated.
      b. Lug Material: Copper, suitable for terminating copper conductors only.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
   6. Do not use tandem circuit breakers.
   7. Do not use handle ties in lieu of multi-pole circuit breakers.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
C. Verify that mounting surfaces are ready to receive panelboards.
D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).
B. Install products in accordance with manufacturer's instructions.
C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
E. Provide required support and attachment in accordance with Section 26 05 29.
F. Install panelboards plumb.
G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
H. Provide grounding and bonding in accordance with Section 26 05 26.
I. Install all field-installed branch devices, components, and accessories.
J. Provide filler plates to cover unused spaces in panelboards.

3.3 FIELD QUALITY CONTROL

A. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
B. Adjust alignment of panelboard fronts.
C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.5 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Receptacles.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with equipment, etc. installed under other sections or by others.

2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Notify engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

2. PART 2 PRODUCTS

2.1 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

2.2 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Ivory

2.3 RECEPTACLES

A. Manufacturers but not limited to:

1. Hubbell Incorporated; _____: www.hubbell.com/#sle.

2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.

3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.
C. Convenience Receptacles:
D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.
   2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
D. Verify that final surface finishes are complete, including painting.
E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
F. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable.
B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
C. Install wiring devices in accordance with manufacturer's instructions.
D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.

I. Install wiring devices plumb and level with mounting yoke held rigidly in place.

J. Install wall switches with OFF position down.

K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.4 FIELD QUALITY CONTROL

A. Inspect each wiring device for damage and defects.

B. Operate each wall switch with circuit energized to verify proper operation.

C. Test each receptacle to verify operation and proper polarity.

D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 31 1000 – SITE CLEARING & DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Removal of drainage structures, pavements, surfacing, base courses, curb, curb and gutter, sidewalks, steps, buildings, foundation walls, utility pipes, and other existing improvements as noted on the drawings.

B. It is the intent that the demolition be complete and adequate for the intended purpose. This work shall include the removal of all items, whether in view or hidden underneath the surface of the ground, regardless of whether shown on the drawings or encountered during construction.

1.2 PERMITS

A. Contractor shall comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess waste materials.

B. Contractor shall obtain and pay for all required inspections, permits, and fees.

1.3 SUBMITTALS

A. The contractor shall submit demolition and clearing procedures and operational sequences and schedules for review and acceptance by the Owner's representative.

1.4 GENERAL PROCEDURES

A. Erect barriers, fences, guardrails, enclosures, chutes, and/or shoring to protect personnel, structures and utilities remaining intact.

B. Protect on-site trees and plants noted on drawings. All landscaping and trees outside of construction limits are to be protected from damage.

C. Protect all existing objects intended to remain. In case of damage, make repairs or replacements necessary at no additional cost to the owner.

D. Minimize interference with roads, streets, driveways, sidewalks, and adjacent facilities.

E. Do not close or obstruct streets, sidewalks, alleys or passageways without permission from authorities having jurisdiction.

F. If closure is permitted, provide signage indicating closure and signage to direct traffic to alternate route.

G. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART 2 EXECUTION

2.1 PREPERATION

A. Notification: Provide the owner's representative a minimum of two business days' notice prior to commencing work of this section.

B. The contractor shall locate existing utility lines and services traversing the site and determine the requirements for their protection. The contractor shall preserve active utilities on the site that are designated to remain.

C. Before starting site operations, the contractor shall disconnect or arrange for the disconnection of all utility services designated to be removed. The contractor shall perform all such work in accordance with the requirements of the utility company or agency involved

2.2 PAVEMENTS

A. In removing pavement, curb and gutter, sidewalks, etc., where a portion is left in place, removal shall be to an existing joint or to a joint sawed to a minimum depth of 2" with a true saw line and a vertical face. Remove sufficient pavement to provide for proper grade and connections in the new work regardless of any limits indicated on the drawing.

2.3 SEWERS

A. Existing castings and culverts, if salvageable and removed intact, remain the property of the contractor.

B. All drainage pipes, which have been or are to be abandoned, shall be permanently sealed at the ends with bulkheads constructed of concrete, having a minimum thickness of 8".

C. Abandon storm sewer structures by breaking the concrete bottom of the structure into pieces no larger than 12" in any direction and removing the top of the structure to 3' below finished grade. Plug all pipes with concrete and fill structure with 1" clean gravel.

2.4 BLASTING

A. Blasting is not permitted.

2.5 DISPOSAL

A. All debris shall be disposed of off-site

B. Do not store or burn materials on-site.

C. All asphalt or concrete materials shall be disposed of off-site.

D. Material acquired through demolition, other than those required to complete the construction project and designated for return to owner, will become the property of the contractor and will be removed from the site and off University property. The material will be disposed of in a legal manner.

E. Abated items will be disposed of per Section 02 8000.

F. Refer to Section 01 7419 for further direction related to diversion and tracking.

2.6 CONSTRUCTION LIMITS

A. The Contractor's operations shall be restricted to those areas inside the construction limits indicated on the drawings. If limits are not indicated, restrict work to the

owner's property, easement, or public rights-of-way.

B. Complete work within public rights-of-way under the permission of the governing agency.

C. The Owner will place the top lift of soil (6" topsoil) and will do the surface restoration.

D. The contractor shall repair damage outside the construction limits at no additional expense to the owner.

2.7 UTILITY ADJUSTMENT

A. The contractor is responsible for the adjustment of all gas vents, manholes, castings, and water valves within the grading limits to match the finished surface.

B. Adjustments shall be coordinated with the utility companies and the cost for all adjustments shall be incidental to construction unless noted as a bid item.

C. The contractor shall repair any damage to utility structures and appurtenances that occurs during construction at no additional cost to the owner.

END OF SECTION 31 1000

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SECTION 31 2000 – EARTH MOVING

PART 1 GENERAL

1.1 SUMMARY

A. Provide earthwork operations. The Contractor shall be responsible for the excavation of all footings and foundations in addition to preparing the pavement subgrade. The Contractor shall extend all utility excavations and services and make final, permanent connections to utility services as required.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Test Reports: Submit for approval test reports, list of materials and gradations proposed for use. **Obtain samples of any proposed fill material and contractor to provide standard proctor test reports to engineer. Supply in-place compaction reports from an independent testing service for all fill materials placed.**

1.3 QUALITY ASSURANCE

A. Compaction:
1. Under structures, building slabs, steps, pavements, and walkways, 95 percent Standard Proctor minimum density, ASTM D 698.
2. Under lawns or unpaved areas, 85 percent, ASTM D 698.

B. Grading Tolerances Outside Building Lines:
1. Lawns, unpaved areas, and walks, plus or minus 1 inch.
2. Pavements, plus or minus 1/2 inch

PART 2 PRODUCTS

2.1 MATERIALS

A. Earthwork:
1. Application: Excavation, filling, compacting and grading operations both inside and outside building limits as required for below-grade improvements and to achieve grades and elevations indicated. Provide trenching and backfill for mechanical and electrical work and utilities. Note: all graded gravel or crushed stone shall be provided by the Contractor.
2. Application: Subbase materials, drainage fill, common fill, and structural fill materials for slabs, pavements, and improvements.
3. Application: Suitable fill from off-site if on-site quantities are insufficient or unacceptable, and legal disposal of excess fill off-site.

B. Acceptable Materials
1. Subbase Material: MoDOT Type 5 Base Rock. Waste lime is not a suitable material.
2. Drainage Fill: Washed gravel or crushed stone.
3. Common Fill: Mineral soil free from unsuitable materials.
4. Structural Fill: Clean, well graded gravel.

5. Suitable Soil: Cohesive soils in the soil classification groups ML, CL, CH or a combination, thereof, free of rock or gravel larger than 1" in any dimension, debris, waste, frozen material, vegetation and other deleterious material.
6. Embedment Material: 3/4” minus waste rock with fines or Suitable Soil

PART 3 EXECUTION

3.1 INSTALLATION

A. All activities will be contained within construction boundaries indicated on site plan. Specified excavation requirements, precautions, and protective systems will be observed at all times.

B. Movement of trucks and equipment on Owner’s property will be in accordance with Owner’s instructions.

C. Topsoil will be stripped from the construction site and stockpiled in designated area. Excess topsoil will be stripped and disposed of legally off site.

D. Trenches will not be backfilled until all required tests are completed and the utility systems, as installed, conform to requirements specified by the contract documents.

E. Excavation is unclassified and includes excavation to subgrade regardless of materials encountered. Repair excavations beyond elevations and dimensions indicated as follows:
1. At Structure: Concrete or compacted structural fill.
2. Elsewhere: Backfill and compact as directed.

F. Maintain stability of excavations; coordinate shoring and bracing as required by authorities having jurisdiction. Prevent surface and subsurface water from accumulating in excavations. Stockpile satisfactory materials for reuse, allow for proper drainage and do not stockpile materials within drip line of trees to remain.

G. Compact materials at the optimum moisture content as determined by ASTM D 698 by aeration or wetting to the following percentages of maximum dry density:
1. Structure, Pavement, Walkways: Subgrade and each fill layer to 95% (-2%+4%) of Standard Proctor maximum dry density to suitable depth. Compaction testing shall be performed immediately prior to the placement of reinforcing steel and new paving materials. Contractor shall be responsible for scheduling testing with owners designated testing agency.
2. Unpaved Areas: Each fill layer to be 85% maximum dry density.
3. A proof-roll shall be required of the subgrade prior to placement of the base course. Proof rolling shall consist of passing a loaded, 20-ton, tandem dump truck over the prepared subgrade soil with a maximum allowable displacement of 1”. Any areas that displace more than 1” shall be compacted until this criterion is met, or those areas may be excavated and backfilled with compacted Type 1 aggregate used for base material. All proof rolling shall be performed in the presence of the Owner’s representative.
4. **Cut areas under proposed asphalt or concrete pavements shall be cut and compacted. After grading to subgrade elevation, scarify the top six inches of the sub-base and compact as outlined above.**
5. Landscaped areas to be left 6” or 18” below proposed finish grade. Fill within 36” of finish grade to be fill per “Suitable Soil” as defined by 2.1-B.

H. Place acceptable materials in layers not more than 6" loose depth for materials

compacted by heavy equipment and not more than 4" loose depth for materials compacted by hand equipment to subgrades indicated as follows:

1. Structural Fill: Use under foundations, slabs on grade in layers as indicated.
2. Drainage Fill: Use under designated building slabs, at foundation drainage and elsewhere as indicated.
3. Common Fill: Use under unpaved areas.
4. Subbase Material: Use under pavement, walks, steps, piping and conduit.
5. Fill in landscape areas (excluding topsoil): Use suitable soil within 36” of finished grade in lawn and planter areas.
6. Embedment Material: Use above new utilities as indicated.

I. Grade to within 1/2" above or below required subgrade and within a tolerance of 1/2" in 10'.

J. Protect newly graded areas from traffic and erosion. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.

K. Control erosion to prevent runoff into sewers or damage to sloped or surfaced areas.

L. Control dust to prevent hazards to adjacent properties and vehicles. Immediately repair or remedy damage caused by dust including air filters in equipment and vehicles. Clean soiled surfaces.

M. Disposal of excavation waste and unsuitable materials shall be the responsibility of the site work contractor. No specific or pre-approved location is being provided by the owner.

END OF SECTION 31 2000

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SECTION 31 2001

SOIL STABILIZATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, include General and Supplementary Conditions, apply to this Section.

B. Section 31 2000 – Earth Moving

1.2 SUMMARY

A. Soil stabilization is the long term physical and chemical alteration of the soils to enhance their physical and engineering properties. Stabilization of in place soils by incorporating available additives can increase the shear strength of soil and/or control the shrink-swell properties of a soil, thus improving the load bearing capacity of a subgrade to support pavements and foundations.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Lime Kiln Dust (Code L, Lime Product) used for stabilization shall meet the following chemical and physical requirements:
   a. Total calcium & magnesium oxides (non-volatile basis) minimum – 60%
   b. Available calcium hydroxide (ASTM C25) plus total MgO content to be equivalent to $CaOH_2$; minimum – 30%
   c. Free water (as received); maximum – 4%
   d. Loss on Ignition (as received, carbon dioxide plus moisture, combined and free); maximum – 40%
   e. Sieve Analysis performed according to ASTM C110
      i. Sieve size 4 – 5% max retained
      ii. Sieve size 30 – 10% max retained
      iii. Sieve size 100 – 25% max retained

B. Portland Cement
   a. Used for soil stabilization shall comply with the latest specifications for portland cement (ASTM C150, ASTM C1157 or AASHTO M850 or blended hydraulic cements (ASTM C595, ASTM C1157, or AASHTO M240).

C. Self-Cementing Fly Ash
   a. Used for soil stabilization shall meet the requirements for “very self-cementing” set forth in ASTM D 5329 – Standard Practice for Characterizing Fly Ash for use in Soil Stabilization.

D. Quicklime or Hydrated Lime
    a. Shall meet requirements of ASTM C977 or AASHTO M216 (Quicklime & Hydrated Lime for Soil Stabilization)

E. Slurry
    a. Made from portland cement, Quicklime or Hydrated Lime used for soil stabilization should contain a minimum of 30% dry solids.

PART 3 – EXECUTION

3.1 SPECIAL EQUIPMENT

A. Spreaders/Distributors
    a. Spreaders or distributors used to apply the chemical being used for soil stabilization shall be a screw-type with a metering device. Dumping materials on site and using a blade to spread the material will not be accepted. Spreaders and distributors used shall be able to demonstrate a consistent and accurate application rate, as well as dust control during application.

B. Mixing Equipment
    a. Only self propelled, high powered rotary mixers capable of mixing to a minimum depth of 16" shall be used The cutting drum should be fitted with cutting teeth capable of trimming earth, aggregate and bituminous mixtures, and so designed that they may be accurately adjusted vertically and held in place. The machine shall not weigh less than 25,000 pounds and shall have such strength and rigidity that it will not develop a center deflection of more than 1/8 inch. Disc harrows, bucket teeth and other equipment that does not meet the above requirements are not recommended to be used for soil stabilization.

3.2 CONSTRUCTION REQUIREMENTS

A. General
    a. No material should be mixed with frozen soil. Soil stabilization construction operations should be done when the soil temperature is 35 degrees Fahrenheit or above. The area of stabilized soil constructed shall be limited to that which can be covered by the succeeding pavement layer during the same construction season.

B. Chemical Selection and Proportioning
    a. The chemical selected and application rates for soil stabilization should be determined by a qualified geotechnical engineer and/or testing laboratory. You may refer to the ARA Soil Stabilization Manual, Table 1 as a broad guideline in determining chemical selection based on soil properties. This table is to be used as a broad guideline only and is not intended to replace laboratory mix designs. Various blends of chemicals are used for chemical stabilization and depending on the situation; these blends can provide a high quality soil stabilization product.

C. Preparation of Subgrade
    a. The area to be treated shall be shaped and graded to the proper grade and cross-section so that when mixed with the specified chemical and water and then recompacted to the required density, the final elevation will be as shown in the plans or as directed by the engineer. This may require that prior to soil stabilization construction operation, the grade be minus .10' or lower. All vegetation and other objectionable material shall be removed from within the limits of the area to be

treated. If slurry is used, the area should be scarified prior to spreading of the slurry to prevent run-off.

D. Material Spreading
    a. The specified quantity of material shall be distributed evenly over the surface of the soil using spreading/distributing equipment that meets the requirements in the Special Equipment Section of this specification. Dumping material on site and using a grading blade to spread the material is not an acceptable method and can lead to unsatisfactory results. Application rate should be determined by percent dry weight of soil and inspection should be based on weigh per square yard. For example; a 5% lime application rate, working with soil that weighs 110 pounds/cubic foot, mixing to a depth of 12 inches, equals an application rate of 50 pounds of lime per square yard.

E. Scarification (Optional)
    a. Following spreading of the chemical and prior to water addition and mixing, the area should be scarified to a depth of 6 – 12 in. to loosen hard, dense soil and allow for water to easily penetrate the subgrade soil prior to mixing.

F. Water Addition
    a. The majority of chemicals used for soil stabilization are applied in dry bulk powder form. Proper hydration during construction is paramount to the performance of the stabilized layer. The amount of water needed to completely hydrate the chemical being used and satisfy the soil's optimum moisture content for compaction changes on every project. Soil types, in-situ moisture content, mixing depth and the chemical being used are all factors that should be considered in determining the amount of water to add during soil stabilization construction operations. Water may be spread by water truck directly on the subgrade or it may be injected directly into the mixing drum of the rotary mixer during the mixing operation.

G. Mixing
    a. The chemical, soil and water should be thoroughly mixed and blended to the full depth of treatment using mixing equipment set forth in the Special Equipment section of the specification to form a homogenous mixture. All chemicals and soils may require different mixing patterns and techniques in order to achieve optimal results.

H. Quicklime, Hydrated Lime and Lime Slurry in heavy clay soils
    a. Mixing dry Quicklime, Hydrated Lime or Lime Slurry in heavy clay soils may require an initial mixing operation, followed by a light rolling to seal the mixture, a mellowing period of 12-48 hours, or till friable, followed by the final mixing operation. Mixing is complete when 100% of the soil-lime mixture passes a 1 in (25 mm) sieve and a minimum of 60% passes a No. 4 (4.75 mm) sieve. If these requirements can be met with the initial mixing operation (1-3 mixing passes) there is no need for the mellowing period prior to compaction. Prior to compaction, the moisture content of the mixture should be at least 1% but not more than 3% above optimum moisture content.

I. Lime Kiln Dust and Portland Cement
    a. LKD and Portland Cement should be mixed with water and soil to the full depth of treatment until a homogenous layer has been obtained and 100% of the mixture passes a 1in. (25mm) sieve and a minimum of 60% passes a No. 4 (4.75mm) sieve. Mixing shall continue until the above gradation requirements are met and must be complete within 4 hours. Prior to compaction the mixture should be at optimum moisture content or optimum moisture content plus 2%.

J. Fly Ash
    a. Fly Ash should be mixed with water and soil to the full depth of treatment until a homogenous layer has been obtained and the mixture is within the specified moisture content. Careful attention must be paid to the moisture content of the mixture during and after mixing operations. The optimum moisture content for fly ash stabilization exists at which maximum strength will be achieved. This optimum moisture content for fly ash stabilization exists at which maximum strength will be achieved. This optimum moisture content for maximum strength is generally 1% - 8% below optimum moisture content for maximum density. The targeted moisture content will vary on each project and should be determined by a testing laboratory prior to construction. Final mixing should be complete with 30 minutes and compaction should commence as soon as practically possible.

K. Compaction
    a. When all of the mixing, gradation and moisture requirements are satisfactorily completed, compaction shall begin. Prior to the beginning of compaction the mixture shall be in a loose condition for its full depth and width. The mixture shall be uniformly compacted until a dry density of not less than 95% of the standard laboratory density of the chemical – soil mixture is achieved. Field density of compacted of the compacted material can be determined by nuclear method in the direct transmission mode (ASTM D 2922, AASHTO T 310). Optimum moisture and maximum density should be determined prior to start of construction.

L. Finishing and Curing
    a. The treated area should be shaped to the required lines, grades and cross sections and final compaction, by way of smooth drum roller, should continue until uniform and adequate compaction is obtained. The surface should be maintained in a moist condition during all finishing operations by means of sprinkling water. Finished portions of the stabilized subgrade that are traveled on by equipment used in construction an adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging completed work.
    b. Bituminous curing coats are widely used for curing hydrated line or Portland cement stabilized subgrades. The purpose of the bituminous cure coat is for moisture protection for an extended period which is more important when using chemicals. The use of bituminous curing coat is less common for Lime Kiln Dust stabilization. If curing materials is used, it shall be applied as soon as possible, but not later than 24 hours after completing finishing operations. The surface shall be kept continuously moist prior to application of curing material.
    c. The curing period should be determined by the project engineer based on soil type, subgrade stability, chemical used and project conditions. Typical curing periods for soil stabilization range from 1 to 7 days. The appropriate curing period will vary on each project. During this period, no traffic shall be permitted on the completed work beyond that required for maintenance of curing moisture, or application of bituminous curing material.
    d. For bituminous curing material, the bituminous material shall be uniformly applied to the surface of the completed chemically stabilized subgrade. The exact rate and temperature for complete coverage, without undue runoff, shall be specified by the engineer. Should it be necessary for construction equipment or other traffic to use the bituminous covered surface before the bituminous material has dried sufficiently to prevent pickup, sufficient sand cover shall be applied before such use.
    e. Sufficient protection from freezing shall be given the chemically stabilized material for 7 days after its construction or as approved by the engineer.

M. Measurement and Payment

a. This work shall be measured:
   1. In Square Yards of completed and accepted stabilized subgrade as determined by the specified lines, grades and cross sections shown in the plans.

b. This work shall be paid for at the contract unit price per square yard of stabilized, multiplied by the quantities obtained in accordance with the Measurement section of this specifications. Such payments shall constitute full reimbursement for all work necessary to complete the stabilized subgrade including watering, curing and all other incidental operations.

END OF SECTION 31 2001

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SECTION 31 2500 – EROSION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of temporary water pollution control measures to prevent discharge of pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful material from the project

1.2 GENERAL

A. The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.

B. The Contractor shall furnish, install, maintain and remove temporary erosion control measures. The Contractor shall prevent discharging silt or polluted storm water from the site.

C. The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative the Contractor's efforts are adequate.

1.3 DEFINITIONS

A. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.

B. Temporary Seeding and Mulching: Placement of a quick ground cover to reduce erosion in areas expected to be re-disturbed.

C. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.

D. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

1.4 SUBMITTALS

A. The Contractor shall submit any coordinate any field modifications to the "Erosion Control Plan" for review and approval by the Owner's Representative. Approval of the plan changes does not relieve the Contractor of his contractual responsibility to prevent the discharge of pollutants into the receiving drainage ways.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wire Supported and Self Supporting Silt Fence:

1. Geotextile Fabric

A. Fibers used in geotextiles shall consist of longchain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.

B. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.

C. Geotextile shall be furnished in 36” width rolls.

D. Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.

E. Each roll shall be labeled or tagged to provide product identification sufficient for inventory.

F. Rolls shall be stored in a manner, which protects them from the elements.

G. Geotextile shall conform to the following:

TABLE 1
PHYSICAL REQUIREMENTS FOR
TEMPORARY SILT FENCE GEOTEXTILES

Property	Test Method	Wire Fence Supported Requirements	Self Supported Requirements
Tensile Strength, Lbs.	ASTM D4632	90 Minimum	90 Minimum
Elongation at 50% Minimum			
Tensile Strength (45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51	75	75
Flow Rate gal/ft/min	VTM-51	0.3	0.3
Ultraviolet Degradation at 500 hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

1. Notes: All numerical values represent minimum average roll value when tested in any principal direction. Virginia DOT test method.

2. Posts: Wood, steel, or synthetic post may be used. Posts shall have a minimum length of 36” plus embedment depth (24” min.). Posts shall have sufficient strength to resist damage during installation and to support applied loads.

3. Support Fence: Wire or other support fence shall be at least 24” high and strong enough to support applied loads.

4. Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

PART 3 EXECUTION

3.1 INSTALLATION

A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.

B. The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lake, ponds, or other areas of water impoundment. Work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.

C. The Contractor shall incorporate permanent erosion control feature at the earliest practicable time.

D. The Contractor at no additional cost shall provide temporary pollution control measures needed to control erosion during normal construction practices to the Owner.

3.2 LIMITATION OF AREA DISTURBED

A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations. The Contractor's operations shall be scheduled to install erosion control features immediately after clearing and grubbing.

B. The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching seeding,

C. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

3.3 BORROW AND WASTE AREAS

A. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

3.4 CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS

A. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

3.5 SILT FENCE

A. General

1. Install along the toe of fills over 10’ in height, along the right-of-way line, parallel to drainageways or around an inlet to prevent sediment from entering the pipe system.

B. General Requirements:

1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.

2. Installation shall conform to the detail at the end of this section.

3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

C. Installation

1. Geotextile at the bottom of the fence shall be buried as indicated on the detail.

2. The trench shall backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.

D. Post Installation

1. Post spacing shall not exceed 8’ for wire support fence installation or 5’ for self-supported installations.

2. Posts shall be driven a minimum of 24” into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner’s Representative.

3. Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.

4. When support fence is used, the mesh shall be fastened securely to the upstream side of the post.

5. The mesh shall extend into the trench a minimum of 2” and extend a maximum of 36” above the original ground surface.

6. When self-supported fence is used, the geotextile shall be securely fastened to fence posts.

E. Maintenance

1. The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.

2. The Contractor shall inspect all temporary silt fences immediately after each rainfall. Inspect daily during prolonged rainfall.

3. The Contractor shall immediately correct deficiencies.

4. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.

5. Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.

6. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.

7. The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area.

3.6 SEDIMENT REMOVAL

A. General

1. Sediment deposits shall be removed when:

    i. The deposits reach approximately one-half the height of a ditch check, straw bale barrier or silt fence.

    ii. The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.

    iii. Requested by the Owner's Representative.

2. Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

END OF SECTION 31 2500

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SECTION 32 12 16

ASPHALT PAVING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Hot-mix asphalt paving.
   2. Asphalt surface treatments.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASDM D 8 for definition 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. Qualification Data: Asphalt contractor must have installed a minimum of ten (10) Division I and a minimum of thirty (30) 400 meter tracks..

C. Material Certificates: For each paving material, from manufacturer.

D. Material Test Reports: For each paving material.

E. Wheel Stops: Manufacturer information including intended installation procedure.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the current MoDOT Standard Specifications for Highway Construction for asphalt paving work.

1.6 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 requirements by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

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.
   a. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
   b. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
   c. Slurry Coat: Comply with weather limitations of ASTM D 3910.
   d. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at the time of placement.
   e. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement

PART 2 – PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Type 1 Aggregate: Per the MoDOT Standard Specifications for Highway Construction.

2.2 ASPHALT MATERIALS

A. All asphalt material shall conform to the MoDOT Standard Specifications for Highway Construction.

B. 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.

B. Sand: ASTM D 1073 or AASHTO M29, Grade Nos. 2 or 3.

2.4 MIXES

A. Hot-Mix Asphalt: Per the current MoDOT Standard Specifications for Highway Construction.

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 excessive yielding. Do not proof-roll wet or saturated subgrades.
   a. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph (5 km/h).
   b. Proof roll with a pneumatic tired loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
   c. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that the asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of asphalt surface.

3.2 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. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.20 gal./sqyd. Apply enough material to penetrate and seal but not flood surface. Allow prime coat time to cure.
   a. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
   b. Protect primed substrate from damage until ready to receive paving.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal/sqyd.
   a. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   b. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 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.

a. Place hot-mix asphalt base course per current MoDOT Standard Specifications for Highway Construction.

B. 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.

3.4 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.
   a. Clean contact surfaces and apply tack coat to joints.
   b. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
   c. Offset transverse joints, in successive courses, a minimum of 24 inches.
   d. Construct transverse joints at each point where the 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."
   e. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
   f. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 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-place compactors in areas inaccessible to rollers.
   a. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

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:
   a. Minimum Asphaltic Course Density: At least 98 percent of reference laboratory density according to ASTM D 6927.
   b. Minimum Bituminous Course Density: At least 95 percent of reference lab density according to ASTM D 6927.

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.

3.6 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
   a. Base Course: Plus or minus 1/2 inch.
   b. Surface Course: Plus or minus 1/4 inch.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straight edge applied transversely or longitudinally to paved areas:
   a. Base Course: 1/4 inch
   b. Surface Course: 1/8 inch
   c. Crowned Surface: Test with crowned template centered and at right angles to the crown. Maximum allowable variance from template is 1/4".

C. The paving tolerances noted above do not control in regards to site accessibility, and providing accessible routes in accordance with the American with Disabilities Act of 1990 and the 2010 ADA Standards for Accessible Design. Accessible routes shall meet the following:
   a. Sidewalks shall not exceed 5 percent slope with a 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
   b. Parking areas for accessible spaces and access isles shall not exceed 2% slope in any direction.
   c. Ramps shall not exceed 8.33 percent with a 2 percent cross-slope and shall be 5' wide except as noted on site layout plan.
   d. All sidewalk intersections shall have a 5 feet by 5 feet landing at 1/4" per one foot max slope in all direction.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field testing, frequency, and methods may vary as determined by and between the Owner and the Owner's Testing Agency.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. Asphaltic surface and base courses shall be randomly cored at a minimum rate of 1 core per 20,000 square feet of paving, but not less than 3 cores in light duty areas and 3 cores in heavy-duty areas shall be obtained. Asphaltic concrete pavement samples shall be tested for conformance with mix design.

E. Immediately replace and compact hot-mix asphalt where core tests were taken.

F. Thickness Test: Measure thickness of each core sample taken. The thickness of the course or the combined courses shall meet or exceed the indicated thickness. Where the deficiency exists, remove the affected pavement area and replace it with new pavement or, at discretion of the Owner, correct deficient paving thickness with tack coat and a minimum of a one inch overlay.

G. Field Density test for in-place materials:
   a. Density test shall be conducted on each core sample taken in accordance with ASTM D1188 or D2726 as applicable.
   b. In-place density tests by nuclear method in accordance with ASTM D2950 shall also be taken as necessary to assure the specified density is obtained. Nuclear density shall be correlated with ASTM D1188 or D2726.

H. Check all pavement for ponding areas and replace pavement as necessary to eliminate.

I. Remove and replace unacceptable areas as directed by the Owner.

J. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.8 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.
   a. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 12 16

SECTION 32 1313 – CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

1. This section applies to all site concrete including but not limited to sidewalks, curb and gutters, and pavement .

1.2 SUBMITTALS

1. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

2. Design Mixes: Submit for approval design mixes, including adjustments for variations in project conditions.

    a. Mixes to be designed in accordance with the Portland Cement Association.

    b. All exposed concrete shall be air entrained. Allowable ranges shall be as follows:

        1. ¾” to 1” aggregate size shall contain 6.0% average entrained air. The total air content range shall be between 5%-7%.

    c. All concrete shall achieve 4000 psi compressive strength in 28 days.

    d. Flint and chert to be limited to 1% maximum, by weight of the coarse aggregate, in all exposed concrete. Lignite will be limited to 0.5% by weight of both the coarse and fine aggregates in all exposed concrete.

    e. Sand shall be from local sources meeting ASTM C-33 Size 67 for concrete.

    f. The use of calcium chloride or flyash in concrete mixes will not be permitted.

    g. Maximum water-to-cement ratio shall be 0.45

    h. Concrete slump shall be a maximum of 4” +/- 1” (ASTM C- 143) as delivered in the field. Contractor may use chemical admixtures to attain a maximum slump of 8” for workability. No water may be added to the concrete mix on site unless water is withheld at the batching facility. If water is withheld at the batching facility it should be reflected on the load ticket. The total amount of water in the mix shall not exceed what is noted on the approved mixed. This shall be noted in the special inspector’s records.

3. Test Mix Reports: Submit test reports for approval prior to construction.

1.3 QUALITY ASSURANCE

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

2. Construction Tolerance: 1/8' in 10' for grade and alignment of top of forms; 1/4' in

10' for vertical face on longitudinal axis.

3. Testing: Independent testing agency shall be obtained by the Owner. Testing requirements shall be as follows:

   a. An ACI certified Grade I field technician shall perform the testing

   b. Test shall be performed for strength, air entrainment, temperature, and slump. Strength tests will require 4 cylinders (1 broken @ 7 days; 2 broken @ 28 days, 1 spare). Test results should be sent to the contractor, architect, and owner's representative.

   c. Concrete will be tested at the minimum rate of one test for the first 25 cubic yards placed each day, and one test for each additional 50 cubic yards placed thereafter.

   d. Test data from concrete cylinder breaks will be evaluated using procedures of ACI 214.

PART 2 PRODUCTS

2.1 MATERIALS

1. Concrete Paving Materials:
   1. Accessories:
      a. Wire Mesh Reinforcement: Welded plain steel wire fabric, ASTM A 185.
      b. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
      c. Fabricated Bar Mats: Steel bar or rod mats, ASTM A 184, using ASTM A 615, Grade 60 steel bars.
      d. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60.
      e. Hook Bolts: ASTM A 307, Grade A threaded bolts.
      f. Liquid-Membrane Forming and Sealing Curing Compound: ASTM C 309, Type I, Class A.
      g. Bonding Compound: Polyvinyl acetate or acrylic base.
      h. Color Pigment: ASTM C 979.
      i. Epoxy Adhesive: ASTM C 881.

PART 3 EXECUTION

3.1 INSTALLATION

1. Comply with ACI 301 for measuring, mixing, transporting, and placing concrete.

2. Proof roll subbase and check for unstable areas. Report unsatisfactory conditions in writing to the owner's representative.

3. Comply with concrete section for concrete mix, testing placement, joints, tolerances, curing, repairs and protection.

4. All concrete trucks shall be directed to washout at plant.

5. Dispose of over-mixed concrete off-site in a legal manner.

6. Protect concrete paving until weight of a person will not leave any impression. Remove and replace concrete paving, which shows impressions or other defects.

Skim coating defects is not acceptable.

7. Contraction joints shall be tooled during finishing or sawed within 18 hours of concrete placement. If the joint edge ravels, do not proceed until concrete has sufficient cure time to saw without damage.

    a. Contraction joints shall have a minimum depth of ¼ of the pavement thickness and a minimum width of 1/8”

    b. Transverse contraction joints will be provided at a maximum of 2.5 times the pavement thickness (in inches) in feet for street pavements and 2.0 times for all other pavements.

    c. Longitudinal joints shall have a maximum separation of 14 feet for streets and drives and 9 feet for sidewalks.

    d. The ratio of slab width to length should not exceed 1.67 for street pavements and 1.25 for all other pavements.

    e. All joints to be sealed per Section 32 1373.

END OF SECTION 32 1313

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SECTION 32 1373 – 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 other 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.

B. Related Sections include the following:
   1. Division 32 Section “Concrete Paving” for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealed product indicated.

B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

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.

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 or are below 40 deg F.
   2. When joint substrates are wet or covered with frost.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the 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.

2.3 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone or Polyurethane Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
   1. Products:
      a. Tremco Spectrum 900
      b. BASF Sonolastic

2.4 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-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

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.

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 backing 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 32 1373

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SECTION 32 18 23.39
SYNTHETIC RUNNING TRACK SURFACING

PART 1 GENERAL

1.01 SUMMARY

1. This section covers all labor and materials required to install prefabricated Synthetic Running Track Surfacing. The Owner has purchased and will provide for installation +/- 88,000 Net Ft2 of Mondo Super-X 720 13.5mm Synthetic Running Track Surface. Materials will be two (2) colors chosen by the Owner's representative. Material includes track oval, two (2) sprint lane extensions, one (1) D-Zone, One (1) Steeplechase Area and Three (3) Runway Event Areas and rails. This material will be turned over to the track installer for installation.
2. Full knowledge and understanding of all drawings, specifications, general provisions of the bidding documents and related foundation and utilities work is required of the Surfacing Contractor.
3. The General Contractor is responsible for the installation of the track subbase works, drainage systems and asphalt base works, designed by others, to corrected levels, per any specified Association's requirements, and as is detailed in the project drawing(s) and specification.
4. The General Contractor is responsible for the purchase and installation, or reinstallation, of any inground sports equipment, as is required.
5. The General Contractor is responsible for ensuring the subbase, base and/or existing surface to receive the Synthetic Running Track Surfacing, as well as all inground sports equipment, meet the specifications of the various manufacturers, the specified Association's requirements, and the rules of the sport.
6. The Surfacing Contractor is responsible for the installation of Synthetic Running Track Surfacing, as is detailed in project drawing(s) and specification.
7. The Line Marker is responsible for all line markings, as is detailed in project drawing(s) and specification, and per specified Association's requirements for track and field events. Line markings will be provided within the applicable shop drawings generated by Mondo USA.

A. Products Supplied by the **Owner**:
   1. Prefabricated Synthetic Running Track Surfacing and Railing.
   2. Accessories required for installation, line marking, maintenance and repair.

B. Products Installed by the Surfacing **Contractor**:
   1. Prefabricated Synthetic Running Track Surfacing and Railing.
   2. Accessories required for installation, line marking, maintenance and repair.

C. Related Requirements:
   1. Division 02 00 00 – Existing Conditions (Not Used)
   2. Per Construction Documents Sheet C-6.0 – Track and Field Equipment
   3. Division 31 00 00 – Earthwork
   4. Division 32 00 00 – Exterior Improvements
   5. Section 32 13 13 – Concrete Paving
   6. Section 32 12 16.36 – Athletic Asphalt Paving
   7. Division 33 00 00 – Utilities

1.02 REFERENCES

A. Association(s):
   1. World Athletics (WA).
   2. National Collegiate Athletic Association (NCAA).

B. ASTM International (ASTM):
   1. ASTM D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
   2. ASTM D2240: Standard Test Method for Rubber Property (Durometer Hardness).
   3. ASTM D3389: Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader).
   4. ASTM F387: Standard Test Method for Measuring Thickness of Resilient Floor Covering With Foam Layer.
   5. ASTM F925: Standard Test Method for Resistance to Chemicals of Resilient Flooring.

6. ASTM F1514: Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.
7. ASTM F2157: Standard Specification for Synthetic Surfaced Running Tracks.

C. World Athletics (WA):

1. WA Track and Runway Synthetic Surface Testing Specifications. World Athletics will certify this track after completion by the Owner's Representative.

D. International Organization for Standardization (ISO):

1. ISO 9001: Quality Management Systems - Requirements.
2. ISO 14001: Environmental management systems – Requirements with guidance for use.

1.03 SUBMITTALS

A. Track Installer (Surfacing Contractor) Qualifications:
1. The schedule for the project is aggressive and requires a contractor with a successful track record of managing NCAA track installations.
2. Surfacing Contractor must be a Certified installer of Mondo America track product. Certification and approval to install Outdoor track (University of Missouri – Columbia).
3. Must have installed ten (10) Division I Mondo outdoor 400-meter tracks.
4. Must have installed ten (10) Non-division I outdoor 400-meter tracks.
5. Successful completion of twenty (20) projects of similar type and scope.

B. Action Submittals:

1. Mondo USA [Kiefer USA] to provide current printed technical data sheets (TDS) and specifications from Manufacturer for all Products Supplied by the Owner, Mondo Super-X 720 13.5mm Synthetic Running Track Surface.
2. Mondo USA [Kiefer USA] to provide three (3) samples, 6 inches by 6 inches in size, for verification of such characteristics as color, texture and finish for each Manufactured Product. Separate samples are required for each color that will be installed. Samples must be representative of Manufactured Product specified and must be submitted to and approved by the Owner. During installation, samples can be used for quality comparison with the installed product. This track installation will be a two-color track, color selected by Owner's Representative.
3. Mondo USA [Kiefer USA] is responsible for submitting samples of available paint colors to the Owner for selection and approval. The WA and NCAA require that the oval lane lines be white but numbers, directional arrows, hurdle marks, and other markings can be selected by the University.
4. Mondo USA [Kiefer USA] to provide shop drawings prepared for the project that illustrate layouts, details, dimensions and other pertinent data useful to Surfacing Contractor and/or Line Marker.

C. Informational Submittals:
1. Mondo USA [Kiefer USA] to provide a current copy of the WA Track Surfacing Products Certification.
2. Mondo USA [Kiefer USA] to provide copy of Manufacturer's current printed outdoor asphalt base preparation guidelines. Mondo USA [Kiefer USA] to confirm that installation standards are met.
3. Mondo USA [Kiefer USA] to provide copy of Manufacturer's current printed installation guidelines for all Owner Provide Products Supplied that are to be Surfacing Contractor installed, including line marking instructions when line marking has been specified, respecting any Association requirements for the sport and desired level of competition. Indicate any adverse conditions that may limit the installation or affect its quality, such as limiting temperature/climatic conditions.
4. Mondo USA [Kiefer USA] to provide a sample copy of the Manufacturer's current printed Limited Material Warranty for the Manufactured Product specified.

D. Closeout Submittals:

1. Surfacing Contractor/Line Marker submit to the Owner a certification of accuracy submitted by a registered Engineer or Surveyor, upon completion of all line markings. The Engineer or Surveyor shall certify the actual line

markings on the Synthetic Resilient Surfacing, not line marking drawing(s) or computation(s). The document shall state that the line markings and layout meet the requirements of project drawing(s) and the Master Specification.
2. Surfacing Contractor to work with Mondo USA [Kiefer USA] to provide Owner with his/her official registered and numbered Manufacturer's Limited Material Warranty certificate for the Manufactured Product installed.
3. Surfacing Contractor to provide Owner the current printed copy of the Manufacturer's outdoor maintenance guidelines for the Manufactured Product.
4. Mondo USA [Kiefer USA] to provide Owner the current printed copy of the Manufacturer's bulletin Spike Recommendations for Super X and Mondotrack (Bulletin 11-001).

E. Maintenance Materials Submittals:

1. Owner has purchase extra stock material from the original dye lot used, for the purpose of facility operations and maintenance (approximately 2% of the total floor surface for each color of Manufactured Product specified), for optimal results.

1.04 QUALITY ASSURANCE

A. Surfacing Contractor, Installer and Line Marker Qualifications:

1. Surfacing Contractor must be recognized and approved by the Manufacturer.
2. Surfacing Contractor shall be fully acquainted with the existing facility and utilities and shall fully understand the difficulties and restrictions attending the execution of the work under contract. Surfacing Contractor is responsible for immediately advising the Owner, in writing, of any restrictions or anticipated difficulty.
3. Surfacing Contractor to provide a list of at least ten (10) completed Track and Field facilities in North America that have been properly certified to meet specified Association's requirements (when applicable), utilizing the same or similar Synthetic Running Track Surfacing as specified. Upon Owner request, Surfacing Contractor to provide a list of ten (10) completed Synthetic Resilient Surfacing reference projects.
4. Installer must be approved by Surfacing Contractor and must have performed same scale installations in the last three (3) years.
5. Surfacing Contractor is required to use approved technicians for the installation of Mondo synthetic track surfaces. Local laborers may be hired for non-technical work only.
6. Surfacing Contractor must ensure that a designated Project Manager/Superintendent be on site every day to supervise the installation of Synthetic Resilient Surfacing. Substitutions of Project Manager/Superintendent shall not be permitted. Mondo USA [Kiefer USA] will provide technical assistance during track installation per their contractual requirements with the Owner's Representative.
7. Surfacing Contractor must provide a technical representative on-site for any technical services during the installation of the Synthetic Running Track Surfacing.
8. The Line Marker shall be approved by the Surfacing Contractor. Painting must be done by professionals with proper experience and qualifications to effectively perform the work; Line Marker to have painted a minimum of twenty (20) track and field facilities in North America that have been properly certified (when applicable) to meet specified Association requirements for desired level of competition. All line markings shall be spray applied under the direction of the qualified Line Marker.
9. Bond tests/mock-ups are highly recommended. When requested by Owner, specify materials needed for mock-up installation based on area size requested by Owner; always follow the same procedures and use the same materials that have been specified for the actual project. The Owner will be responsible for deeming the mock-up acceptable.
10. All machinery and materials used must be only those approved by the Owner and Manufacturer.

B. Manufacturer Qualifications:

1. Manufacturer must be certified ISO 9001 and ISO 14001. Upon Owner request, Mondo USA [Kiefer USA] to provide copies of the ISO 9001 and ISO 14001 certifications from the Manufacturer's plant where the Synthetic Resilient Surfacing product was produced.
2. Manufacturer must have a minimum of fifteen (15) years of experience in the manufacturing of prefabricated Synthetic Running Track Surfacing. N/A – Material is a direct purchase from the Owner

3. Manufactured Product must have undergone a vulcanization process; factory lamination is not accepted as equivalent. N/A – Material is a direct purchase from the Owner

C. Slopes & Tolerances:
   1. The maximum lateral inclination permitted for the track across the full width of the track, outermost lane down to Lane 1, and across all runways, shall not exceed 1:100 (1.0%) for WA and NCAA installations and 1:50 (2%) for NFHS installations. In any case, the minimum lateral inclination shall be no less than 0.6%.
   2. The maximum overall downward inclination permitted in the running direction for the track, the running direction for all runways and the throwing direction for all landing sectors, measured over the full length of any straight track distance, the last 40 meters of runways and the full length of landing sectors, shall not exceed 1:1000 (0.1%).
   3. High Jump – Maximum inclination of the last 15 m of the approach and take-off area shall not exceed 1:250 in the running direction toward the center of the crossbar.
   4. Depressions cannot exceed 3 mm under a 1 m straight edge or 6 mm under a 4 m straight edge.
   5. These requirements are assumed to reflect the status quo of the existing track configuration; should any areas proves to be noncompliant, remedial works will be subject to repair by the General Contractor or other, this work is not the responsibility of the Surfacing Contractor.
   6. At the completion of the construction of the track and field base, the General Contractor shall supply to the Surface Contractor a topographic survey confirming that the elevations/slopes of the base meet the rules/requirements of the sport and/or the specifications and to show that the track and field areas will meet the rules of the sport. The General Contractor will provide adequate test results verifying that the installed asphalt is to required specification. The asphalt testing and topographic survey is for the account of the General Contractor.

1.05 DELIVERY, STORAGE AND HANDLING

A. Products Supplied must be delivered in Manufacturer's original, unopened and undamaged packaging with identification labels intact.

B. Products Supplied must be protected from exposure to harmful weather conditions and must be safely stored on a clean, dry, flat surface. Store rolls of Synthetic Running Track Surfacing upright. Mondo USA [Kiefer USA] will ship and store material in a climate controlled / licensed and bonded facility until notification by Owner's Representative is provided for material delivery. Mondo USA [Kiefer USA] will ship [FFO] to the project site, and is responsible for receipt, unloading and inspection of all materials. Upon acceptance, Mondo USA [Kiefer USA] will work to distribute material over the track for installation of the Surfacing Contractor.

C. Climate controlled storage is recommended. Storage temperature must not be below 40°F (4°C) and must not exceed 100°F (38°C).

D. Avoid storing Manufactured Product for extended periods of time or additional material trimming may be required.

E. Products Supplied need not suffer damage during handling (i.e. dents/scratches, edge chipping, excessive warping, etc.).

1.06 SITE CONDITIONS

A. The General Contractor shall be responsible for ensuring required drainage and base works. The General Contractor will provide a technician on-site during sub-contract installations through the completion of the contract. The surfacing areas must drain properly and be free of bumps and/or depressions.

B. The General Contractor or Construction Manager shall be responsible for ensuring all site conditions meet the requirements of the Manufacturer, as referenced herein at sections 3.02 and 3.03. The Owner's Engineering Representative will need to be present when asphalt base is being placed for testing, inspection and quality assurances.

C. The Surfacing Contractor will provide a technician who will review the asphalt specification, as supplied by the General Contractor, making sure the specification is acceptable and verifying the suitability of the HMAC (hot mix asphalt concrete) after installation. Mondo USA [Kiefer USA] will also provide technical assistance as a secondary quality check of the asphalt base. The asphalt base will need a 28-day cure time before synthetic running track surfacing is installed.

D. Any concrete works are the responsibility of the General Contractor. If Manufactured Product will be glued to concrete in designated areas, then General Contractor must verify with the Manufacturer all requirements for curing compound/agents, and any special moisture tests or treatments necessary.

E. Installation of the Products Supplied shall not take place until the completion of adjacent or concurrent construction operations which generate dust, airborne abrasives, or any other by-product that, in the opinion of the Owner or Manufacturer, would be harmful to the Manufactured Product.

F. General Contractor is responsible for maintaining a secure and clean working area before, during and after the installation of the Synthetic Running Track Surfacing.

1.08 WARRANTY

A. The Manufactured Product is warranted to be free from manufacturing defects for a period of one (1) year from the date that is within 90 days from shipment from the Manufacturer, per the terms and conditions of the Manufacturer's written Limited Material Warranty.

B. The Manufactured Product is warranted against excessive wear under normal usage for a period of ten (10) years from the date that is within 90 days from shipment from the Manufacturer, per the terms and conditions of the Manufacturer's written Limited Material Warranty.

C. Refer to current copy of Manufacturer's written Limited Material Warranty for all terms and conditions, which shall be obtained directly from Manufacturer. In no event shall any warranties provided by any third parties (including distributors, insurance and/or private label providers) be considered a valid.

D. Mondo USA [Kiefer USA] to provide material warranty information to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURED PRODUCT – OWNER PROVIDED / CONTRACTOR INSTALLATION

A. Manufacturer:

1. Mondo S.p.A., Piazzale E. Stroppiana, 1, 12051 Alba, Fraz. Gallo – Italia.

B. Description:
1. Super X 720 is prefabricated rubber track surfacing with a honeycomb (elongated hexagon-shaped) design and engineered shock absorption layer for superior biomechanical properties and athlete comfort, calendered and vulcanized with a particular closed cell structure, based on special isoprenic rubbers, mineral fillers, stabilizing agents and pigmentation, with a system of differential elasticity between top surface and base, as manufactured by Mondo S.p.A.
2. Manufactured in two layers which are vulcanized together. The shore hardness of the top layer will be greater than that of the bottom layer; shore hardness of layers to be recommended by the Manufacturer and the limits specified.
3. Thickness: 0.531 in. (13.5 mm).
4. Colors: Provided P-122 Gold and P-31 Medium Grey as selected by Owner from Mondo USA [Kiefer USA] standard color selection.
5. Surface Texture: Matte Super X 720 embossing. Non-directional, irregular tessellation patterns with interconnected surface channels. Directional patterns shall be deemed unacceptable.
6. Format: Sheets available in widths from 4' (1.22 m) to 5'3" (1.60 m) and 49'2" (15 m) long [min. 19'8" (6 m)/max. 52'5" (16 m)].

C. Performance:
1. When applicable, refer to Association performance requirements for desired level of competition.
2. Performance of Manufactured Product to conform to the following criteria:

Performance Criteria	Test Methods	Requirements**	Results*
Elongation at Break	ASTM D412	≥100%	≥200%
Tensile Strength	ASTM D412	≥75 psi	≥135 psi
Hardness, Shore A (Wear Layer)	ASTM D2240	55 ±5	50
Hardness, Shore A (Backing)	ASTM D2240	35 ±5	40
Abrasion Resistance (H18 wheel, 500g, 1000 cycles)	ASTM D3389	≤2.0 g	≤1.2 g
Thickness	ASTM F387	13.5 mm (±0.3 mm)	13.5 mm (±0.3 mm)
Chemical Resistance	ASTM F925	≤ Slight Change	Compliant***
Heat Stability	ASTM F1514	≤8.0 ΔE	Compliant
Synthetic Surfaced Running Tracks	ASTM F2157	Class A	Class A
Elongation at Break	EN 12230	≥40%	≥115%
Tensile Strength	EN 12230	≥0.4 MPa	≥0.75 MPa
Slip/Skid Resistance (Dry)	EN 13036-4	80-110	83
Slip/Skid Resistance (Wet)	EN 13036-4 (WA)	≥47	61
Shock Absorption	EN 14808 (WA)	35-50%	39%
Vertical Deformation	EN 14809 (WA)	0.6-2.5 mm	Compliant
Spike Resistance	EN 14810	ΔTr% ≤20	Compliant
Spike Resistance	EN 14810	ΔEb% ≤20	Compliant
Track and Runway Testing Specifications	World Athletics (WA)	Compliant	Compliant
Certified Track Surfacing Product	World Athletics (WA)	Compliant	WA Certified

*Result from manufacturing controls or third-party testing can vary between production lots, laboratories, methods and/or equipment, and as such do not constitute representations or warranties as to any particular production lot. Mondo reserves the right to modify product design and/or specifications at any time without notice.

****Specified product must meet the minimal requirement for the characteristic listed.**

***For the complete list of chemicals tested, concentrations and contact time, please communicate with Mondo's Technical Department.

D. Limitations:

1. Athletic footwear with spikes is permitted onto Super X 720, provided that use and spike specifications always respect Manufacturer's current guidelines, as outlined in the bulletin Spike Recommendations for Super X and Mondotrack (Bulletin 11-001).

E. Materials:

1. Provide Super X 720, as manufactured by Mondo S.p.A.
2. Provide Synthetic Running Track Surfacing, as specified in section 2.01, point B. Description.

2.02 ACCESSORIES

A. Provide adhesive certified by Manufacturer: Mondo PU 100 or EPU 200 for installations over asphalt outdoors. For suitability, recommendations, and use, please refer to Manufacturer's current printed adhesive guidelines.

B. When applicable, substrate surface patching or levelling products to be supplied or recommended/approved by Manufacturer.

C. If line markings are specified, all painting products provided will be by the Owner, are to be supplied or recommended/approved by Manufacturer.

PART 3 EXECUTION

3.01 INSTALLERS

A. Refer to section 1.04 of this document for information on installers.

3.02 EXAMINATION

A. Surfacing Contractor to review bidding documents and specifications, and to verify suitability of installation by General Contractor's sub-contractors, the asphalt base and any in-ground equipment.

B. Prior to installation, Surfacing Contractor to verify that the surfacing areas drain properly and are free of bumps and/or depressions.

C. Prior to installation, Surfacing Contractor to obtain confirmation that the asphalt and/or concrete base works have been installed per specification. When applicable, confirm concrete surfaces are free from bond inhibitors and confirm acceptable moisture levels, prior to gluing down Synthetic Running Track Surfacing; refer to the current copy of the outdoor concrete substrate requirements.

D. General Contractor to confirm completion of adjacent or concurrent construction operations, prior to installation of Synthetic Running Track Surfacing.

E. General Contractor is responsible for maintaining a secure and clean working area before, during and after the installation of the Synthetic Running Track Surfacing.

3.03 PREPARATION

A. General Contractor:

1. General Contractor is responsible for the installation, if any, of the track subbase works, drainage systems and asphalt base works, designed by others, to corrected levels, per specified Association’s requirements, and as is detailed in the project drawings and specifications.
2. Prepare asphalt base in accordance with Manufacturer’s current printed guidelines.

B. Surfacing Contractor:

1. Surfacing Contractor is required to have a Technical Representative verify the suitability of the installed asphalt base, prior to the installation of the Synthetic Running Track Surfacing.

3.04 INSTALLATION

A. Weather and Climate:

1. If, in the opinion of the Surfacing Contractor, Manufacturer or Owner, weather and climatic conditions are having or will have an adverse effect on the installation, work shall be delayed until the adverse condition has passed.

B. General Contractor:

1. If any, General Contractor is to purchase and install or adjust all existing fixtures and structures, and all existing inground track and field equipment. Contract Documents Sheet C-6.0 Track and Field Equipment. It shall be the General Contractor's responsibility to see that each item is supplied and installed and/or adjusted as per the Manufacturer's specifications, respecting specified Association’s rules when applicable. The items where Synthetic Running Track Surfacing must be installed up to or on top of must be installed prior to the installation of the Synthetic Running Track Surfacing. Pole-vault box covers, pit covers and take-off boards shall receive Synthetic Running Track Surfacing.

C. Surfacing Contractor:

1. Surfacing Contractor to sufficiently clean down all areas to be surfaced and protect all areas not to receive Synthetic Running Track Surfacing.
2. Surfacing Contractor to install rolls of Synthetic Running Track Surfacing following Manufacturer’s current printed guidelines and respecting the requirements of the Master Specification.

3. Surfacing Contractor to install all removable Synthetic Running Track Surfacing as covers in all throwing circles within synthetic aprons, on pole vault box covers, on long/triple jump blanking boards and, if included, apply surfacing to the sand pit covers and the steeplechase water jump pit cover.
4. Surfacing Contractor to install all Accessories following Manufacturer's current printed guidelines.
5. World Athletics will certify this track after completion.
6.

D. Line Marker:

1. Line Marker to paint all line markings following Manufacturer's current printed painting procedure. Paint will be provided by the Owner. Accessories will be provided by the line marker, which would include but not limited to stencils, numbers, any items necessary for line painting to be installed.
2. All line markings shall be spray applied.
3. Line Marker to paint all line markings following specified Association's current requirements for track and field events, drawings and the Master Specification.
4. When applicable, follow specified Association's current guidelines; stripe all lane lines, start-finish lines, event markings, 5 sets of lane numbers (one color) and runway borders according to the standards of the desired Association.

3.03 REPAIR

A. Refer to section 1.03, point D.-1, for extra stock materials. Repair material must come from the same original dye lot as the Manufactured initially installed.

B. Repairs are to be performed by Surfacing Contractor's professionally qualified installers/technicians only.

3.04 CLEANING

A. It is highly recommended to wait at least 6 months before performing the initial wash of the outdoor Synthetic Running Track Surfacing. This allows the natural paraffins to migrate to the surface of the product. In any case, the initial wash should not occur before a minimum of 72 hours after the material has been fully installed, and a minimum of 30 days when the surface has received newly painted lines so that the paint has time to properly cure.

B. Always maintain the Synthetic Running Track Surfacing following Manufacturer's current printed guidelines.

END OF SECTION

University of Missouri – Soccer Field
Columbia, MO

HIGH PERFORMANCE NATURAL GRASS
SECTION **32 2910**

PART 1 - GENERAL

1.1 INFORMATION AVAILABLE TO BIDDERS

A. The Owner has available subsurface investigation and engineering analysis report for the site.

1.2 SUMMARY

A. High Performance Natural Grass is referred to as the “Turf System” in this specification section and is composed of the following Sub-systems/requirements:
B. Earthwork Requirements:
C. Excavation, trenching, grading, filling, backfilling, compaction.
D. Disposal of spoil materials.
E. Drainage System Requirements:
    1. Filter Fabric (Entire Subgrade).
    2. Gravel drainage material.
    3. Drain pipe, collector pipe, main line pipe and fittings.
F. Playing Field Requirements:
    1. Soil materials and amendments.
    2. Sod.
    3. Soccer Goals Netting, Post Sleeves, and Standards

1.3 DEFINITIONS

A. Excavation: Removal of material encountered to sub-grade elevations indicated and subsequent disposal or placement of materials removed.
B. Unauthorized Excavation: Inadvertent or purposely removing materials beyond indicated sub-grade elevations or dimensions without specific direction of Architect. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation directed by Architect shall be at Contractor's expense.
    a. Unauthorized excavation, including disposition of additional excavated materials and other work resulting from slides, cave-ins or remedial work shall be at Contractor's expense.
C. Additional Excavation: When excavation has reached required sub-grade elevations, notify Architect, who will make an observation of conditions. If Architect determines that bearing materials at required sub-grade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Architect.
    a. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.
D. Sub-grade: The undisturbed earth or the compacted soil layer immediately below proposed drainage fill or playing field soil materials.
E. Unclassified Excavation: The term “unclassified excavation”, as used herein, includes the excavation of all materials required for the work obtained within construction limits of project, including bedrock, surface boulders, wasted sections of concrete, asphalt or other debris.
    a. The subsurface investigation and engineering analysis for the Turf System describes the quality and physical characteristics of bedrock within the limits of construction.

1.4 SUBMITTALS PRIOR TO BID

A. Pre-bid Materials Observation and Testing: Bidders are encouraged but not required to pre-qualify Bidder located root zone materials, gravel drainage material, and sod with the Owner's Testing Agent. All costs associated with pre-bid testing shall be borne by the Bidder and submitted to the Testing Agent. Deviations to the specified materials should be submitted to the Architect up to 14 days before bid date for consideration as a bid option. Proposed substitutes

received after this time will be rejected. Pre-bid materials testing requirements are described in "QUALITY ASSURANCE."

1.5 SUBMITTALS REQUIRED WITH BID

A. Bidders Qualification Requirements: Each bidder shall provide proof of three (5) or more recent sports field installations which have been in use successfully for three (3) or more years. The representative sports field installations shall include sand-based, irrigation and subdrainage systems incorporated with the fields. Field Builder will be Certified as a Field Builder – Natural Turf by the American Sports Builder Association (ASBA). If this cannot be adequately shown as stated above, the bidder shall submit the following additional information:
   a. Listing of work similar to that required under this contract with phone numbers, client contacts and installation dates. Construction photographs showing operations and equipment used should be submitted and will be returned after Owner / Architect review.
   b. Listing of employees to be used on this project and their experience level.
   c. Listing of equipment proposed to use for construction.
   d. This information shall be reviewed by the Architect and Owner for acceptance or rejection of the proposed Bidder.

B. Submittals/Shop Drawings
   a. Sod Supplier
   b. Synthetic turf
   c. Any product that is not specified.

C. All Field Installers are to submit a preliminary bar chart field construction schedule that lists the types of work to be performed and length of time for each.

1.6 QUALITY ASSURANCE

A. Codes and Standards: Comply with all applicable local, state and Federal rules, regulations and ordinances concerning sloping of excavation, trenching and safety of workers, including the latest version of OSHA requirements.

B. Irrigation System Standards: Comply with all applicable provisions of the latest edition of the following codes:
   a. UPC Uniform Plumbing Code
   b. UBC Uniform Building Code
   c. IBC International Building Code
   d. NEC National Electric Code

C. Provide labeled equipment certifying approval, as hereinafter specified, by the following organizations:
   a. NSF National Sanitation Foundation
   b. UL Underwriters Laboratories

D. Soil Testing and Observation Service: Owner will employ and pay for a qualified independent geotechnical testing and observation laboratory to perform soil testing and observation service during earthwork operations, provide necessary means to assure cooperation with testing firm.

E. Owner Testing and Verification: An agent representing the Owner shall be present during the preparation and packaging of samples from the processed sand, the sand and peat blended and the gravel drainage material. The sample shall consist of cross-sections taken from the top, bottom, and sides of the stockpile. A one-gallon sample in a sealed plastic bag shall be packaged and shipped to the Owner's testing agent:

   a. Mr. Duane Otto
      Turf Diagnostics and Design
      613 E. 1st
      Linwood, KS 66052
      Phone: 913-723-3700
      Fax: 913-723-3701

F. Materials Testing after Award of Contract: The Owner's Testing Agent shall test all specified materials, materials previously accepted as substitutes and materials pre-qualified during the pre-bid phase during construction. Testing shall be performed in the following phases:

   a. Phase One - Materials Selection and Definition Prior to Construction: The Owner shall pay for the Phase One costs for only the first submittal including testing and shipping. All costs for subsequent testing required to gain approval of rejected materials shall be paid for by the Contractor.
      i. Gravel Drainage Material Testing: Gravel shall be submitted simultaneously with root zone sand submittals. Upon approval of the gravel drainage materials, the test results will establish the specifications for approval or rejection of all subsequent submittals during construction.
      ii. Root zone Mix Testing: The root zone mix shall be evaluated using the modified 2004 USGA testing protocol as a guideline.
      iii. Processed Sand and Peat Testing: A processed sand sample and a processed peat sample shall be tested for compliance with the specifications. Upon approval of the sand and peat samples, the test results will establish the specifications for approval or rejection of all subsequent submittals during construction.
      iv. Root zone Mix Formulation and Testing: The Owner's Testing Agent shall produce a representative sample of the proposed root zone mix by using ~~define~~ the ratio of approved processed sand and approved peat. The ratio of sand/peat shall be based on laboratory testing and performance criteria established by the specifications. The physical and performance characteristics of the sample developed by the Testing Agent shall define the root zone mix. Upon approval of the root zone mix the test results will establish the specifications for approval or rejection of all subsequent submittals during construction.
      v. Nematode Testing: The Owner's Testing Agent shall determine a nematode assay. Plant pathogenic nematode threshold shall be determined on the sod materials and growing medium. Plant pathogenic nematodes shall not exceed critical threshold values for sod or growing medium at time of delivery.
   b. Phase Two - Quality Control Testing during Construction: The Owner shall pay for the first submittal Phase Two costs during construction including testing and shipping. All costs for subsequent testing required to gain approval of rejected materials shall be borne by the Contractor. All materials shall be tested and approved prior to delivery to the Playing Field System site
      i. Suggested Sampling Collection Procedures: A 2.5 inch dia. PVC pipe about 4 feet long shall be cut at an angle on one end of pipe. The pipe acts as a sample collection tube. Push the pipe into stockpile in random locations. Usually, 4 to 8 locations in each pile (sub samples) are combined and placed into a clean bucket. The samples in the bucket shall represent the stockpile being sampled. Thoroughly mix the samples in the bucket and fill a labeled zip lock freezer bag (1 gallon) with material from the bucket. Left over material can be discarded. To sample a new stockpile clean bucket and pipe and repeat. Note locations of stockpiles where composite samples (not sub samples) were taken. Include a sample transmittal letter to identify the source of samples location. Do not use labels to identify samples. Use a waterproof marker and double bag the sample(s). Send the sample to Owner’s Testing Agent. Contract to coordinate all weekend sample deliveries with Owner’s Testing Agent.
      ii. Gravel Drainage Material Testing: A one (1) gallon sample of each 500 ton lot of gravel shall be tested.
      iii. Upon approval of each lot of materials, the gravel shall be released for delivery to the site and placement in the Playing Field System.

iv. Root zone Mix Testing: Processed peat shall not be mixed with any sand until the Owner's Testing Agent has approved the particle size distribution for each lot and determined that the peat and sand materials are uniform and representative of the approved samples per Phase One Testing Requirements. After approval of the Phase One root zone components and mix, prepare the processed sand in lots of 1000 tons. A one (1) gallon sample from each 1000 ton lot shall be submitted for testing. Subsequent to the approval of each 1000 ton lot blend the sand with the processed peat at the ratio established by the Owner's Testing Agent.

v. A one (1) gallon sample of the first 1,000 ton lot of root zone mix shall be submitted for testing including particle size distribution, performance, and organic matter. Upon approval of this submittal, a one (1) gallon sample of each subsequent 1000 ton lot of root zone mix shall be submitted for organic matter testing and visual observation only, unless the Testing Agent determines that inconsistencies in the materials are apparent.

vi. Upon approval of each lot of root zone mix, the material shall be released for delivery to the site and placement on the Playing Field System.

G. Fertility Testing During Maintenance Period: The Owner's Testing Agent shall assign a local testing laboratory(s) to be used for soil and tissue tests during the grow-in period. Soil and tissue samples shall be submitted for testing every other week after the installation of the sod through substantial completion. The local testing laboratory shall make recommendations to the Owner's Testing Agent for fertilizer ratios and rates and application of macro and micronutrients.
    a. The Owner's Testing Agent shall specify the required fertilizer ratios and rates and applications of macro and micronutrients during the maintenance period.

H. Sod Supplier Grow-In Program: Upon approval of a sod material submit to the Architect and the Owners' Testing Agent the location of the sod supply. The Sod Supplier shall submit to an on-site observation of the area to be used as the sod source. An area of sufficient size to plant the project shall be designated and reserved for the project in the presence of an Owner's Representative. This area should also be where the tested and approved sample was taken. During the grow-in and harvest period, the Owner, Architect and Owner's Testing Agent shall be allowed to inspect the source at any time.

I. The Sod Supplier shall submit a grow-in schedule for the sod including but not limited to:
    a. Watering
    b. Fertilization (rates, ratios)
    c. Weed Control
    d. Pest Control
    e. Mowing

J. Height of Cut of Grass: Warm Season Grass shall be maintained at a height of 3/4 to 1 inch at the farm.

K. Fertility Testing: Fertility testing cost shall be borne by the Owner. The Sod Supplier shall submit bi-weekly (alternating weeks) soil and tissue testing to determine and fine-tune the fertility program. The Owners Testing Agent shall also be utilized during the maintenance period of the stadium field.
    a. The results and recommendations shall be submitted to the Owner's Testing Agent for approval.

L. Irrigation System Observation: Continual observation of the irrigation system shall be performed to insure even coverage of the total grow-in area throughout the Sod Supplier's contract.

M. Sod Harvesting Procedure: Uniformity of cut is required. Sod shall be big roll cut in approximate widths of greater than or equal to 30 inches (split 42" rolls are acceptable) and minimum lengths of 50 feet having 3/4 inch of topsoil below the thatch layer across the width and length of each section. Thickness and width shall be kept to strict dimensions. Edges shall be cut at 90 degree angles to provide for tight fit during installation.
    a. Owner may reject sod not meeting specifications as determined by the Owner's sole judgment.

1.7 PROJECT CONDITIONS

A. Site Information: Data in subsurface investigation reports was used for the basis of the design and is available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. Contractor will be responsible for interpretations or conclusions drawn from this report.
   a. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Use of Explosives: Use of explosives is not permitted.

C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
   a. Operate warning lights as recommended by authorities having jurisdiction.
   b. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

D. Existing Bench Marks: Carefully preserve and maintain existing bench marks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the Owner.

E. PVC Pipe Installation: PVC pipe shall be installed in dry weather when temperature is above 40^{O} F.

1.8 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Root zone Mix: Blended approved root zone materials at an approved location that is not at the Playing Field System site. Deliver approved lots in clean, washed and covered trucks to eliminate contamination during transportation. Stockpile of approved material on site shall be coordinated with the General Contractor and placed in an area free of contamination such as low, wet and/or refuse areas if Playing Field System area is not available.

C. Sod: All sod shall be transported to site and placed within twenty-four (24) hours after cutting. Sod cutting and shipping shall be coordinated with the sod installers.

1.9 COMPLETION DATES / OBSERVATIONS

A. General: Field completion and observations shall be separated into 2 phases, “Initial Completion” and “Substantial Completion.”

B. Initial Completion: Scheduled date for initial completion shall be at least 30 calendar days before substantial completion. Notify the Architect and Owner in writing, 7 days prior to scheduled date for observation for “Initial Completion.” A punch list of items necessary for completion to obtain “Substantial Completion” shall be provided by the Architect in written form. To be considered “Initially Complete” the following items shall be provided:
   a. Root zone mixture in place, compacted and to grade.
   b. Drainage system installed and proof of working order.
   c. Irrigation system tested, installed and adjusted.
   d. Sod areas laid, joints and seams filled.
   e. One top-dressing application over entire grass surface complete.

C. Substantial Completion: The Contractor shall notify the Architect and Owner in writing, 7 days prior to a requested date for a site observation to meet “Substantial Completion.” To be considered “Substantially Complete” or “Playable” the following items shall be provided:

a. All “Initial Completion” punch list items are complete.
b. Maintenance Log compiled in a loose leaf 3-ring binder detailing all work done on fields from installation through Substantial Completion. Log shall include product information sheets and manufacturers representatives contacted with phone numbers.
c. In addition to top dressings as required in “Initial Completion” a minimum of one top dressing performed on total field grass surfaces.
d. Root depth of 3-1/2 inch averaged over the entire field as determined by 8 core samples equally representative of the field areas as determined by the Architect.
e. Absence of all joints and cracks in sod installation as to appear “seamless”.
f. Dense, green, consistent grass void of any bare or patchy areas.
g. Smooth, level playing surface compacted and level to grading tolerances.
h. Written warranties/guarantees.
i. Grass maintained at a height of 3/4 inch to 1 inch if warm season, mowed with reel-type equipment.
j. Stockpiling of field materials.

1.10 WARRANTY / GUARANTEE

A. General: Warranties / Guarantees specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and are in addition to and run concurrent with other warranties/guarantees made by the Contractor under requirements of the Contract Documents.
B. Installer Guarantee: Provide a “Full System Guarantee” agreement. Guarantee shall be signed by the President of Playing Field System installer. Provide a guarantee for repairing or replacement of the Playing Field System materials and workmanship for the following period of time:
    a. One year after date of Substantial Completion.
C. The following are inclusive of the term “Playing Field System” for provisions of the guarantee:
    a. Working functions of the irrigation system.
    b. Working functions of the drainage system.
    c. Final grade tolerances to one quarter inch in the length of 25' of finish grade in any direction.
    d. All materials and products specified.
    e. Root zone mixture shall be guaranteed to have a percolation rate of 6-10 inches per hour.
    f. Grass shall be true of species and type and free from objectionable weeds and/or grasses.

1.11 FIELD GROW - IN MAINTENANCE

A. General: Perform all operations necessary to maintain the Playing Field System through the date of Substantial Completion. At that time an extended maintenance agreement may or may not be negotiated at the Owner's request. Field Installer and Contractor shall be on site to direct all field subcontractors during this period.
B. Minimum Requirements: The following list of items represents the minimum operations necessary to maintain the fields during the installation period. Prepare and present to the Owner and Architect in writing a maintenance schedule prior to installation for consideration. Representative schedule items shall include, but not be limited to the following:
    a. Warm Season Mowing: Grass shall be maintained to a neat uniform appearance using only reel-type, clean, sharp, non-contaminated equipment. Grass shall be maintained to a height of 3/4 to 1 inch during initial and substantial completion. Remove grass clippings only when an unsightly condition will occur. Frequency will be dependent on the removal of no more than 1/3 of the blade height at any one time to maintain the desired grass height. Mowing pattern shall vary with each cut.
    b. Rolling-Sod: The grass field shall be rolled in two directions on initial planting of the sod. Care shall be taken not to damage irrigation heads. Additional rolling shall be accompanied by additional aeration operations. One and one half to two ton rollers maximum.

c. Washouts: Erosion due to excessive rainfall or faulty irrigation shall be corrected immediately.

C. Top Dressing: In addition to the initial top dressing during the sod installation to fill in gaps between sod, two lifts of 1/4 inch will be required using the same root zone mix as specified previously. Additional top dressing as required to insure a smooth and safe playing surface may be required. Care shall be used to avoid smothering sod.
   a. A minimum of one top dressing shall occur prior to both initial completion and substantial completion.

D. Aeration: Aeration of the field shall be required at least one time prior to playing on the field, if determined to be at the appropriate time of year for the grass type and only after the sod is firmly knitted. Removal of cores is required. Only hollow tine equipment shall be utilized with a 3/8 inch diameter with 3 inch x 3 inch grids in one direction.

E. Sod Replacement/Patching: Verified sod of the same type and source shall be used when necessary. All patches shall be a minimum of 12 inches in width and length.

F. Verticutting / Slicing: If the installed sod is determined to be “thatchy”, the Contractor shall verticut the installed sod to a depth of approximately 1/2 inch and remove all thatch material disturbed during this operation.

G. Fertilization: Four days after sod installation the Contractor shall apply by spray, LAUNCH, at mfg. recommended rate. Apply an additional application every 5-7 days. One week after the installation of the sod and the initial fertilization, apply one half pounds of N of Scott's product 8420 (9-0-32) or equivalent per 1000 square feet every 5-7 days until root zone surface is stabilized and grass clipping are able to be collected. At that time take soil and tissue samples and submit to the testing laboratory assigned by the Owner's testing agency for results. These results and recommendations shall be submitted to the Testing Agent for consideration and approval. An appropriate fertilizer and rate shall be applied as recommended by the fertility tests throughout Substantial Completion. Both granular and liquid fertilizers can be used.

J. Weed and Pest Control: All treatments will comply with local and state codes. Utilize only commercially licensed personnel and applicators to perform these operations. Treatments shall be made according to the needs of the field as determined by the Owner, Owner’s Testing Agent, and Architect.

K. Three to six weeks after planting, the chemical weed control program should begin only if the Bermuda has greened up, rooted, begun to spread and is fully established. The root zone mix shall contain adequate moisture prior to any herbicide application. Do not use pre-emergent herbicides until the field has survived 1 winter.

a. Weed growth shall be monitored with a mixture of MSMA 6.6(44 oz./ac.), Southern Trimec(16 oz./ac.), Basagran(32 oz./ac.), a silicon-based adjuvant and spreader/sticker or approved equal program.

b. Applications shall be made when grass has had 3 days growth since most recent mowing. Spray should remain on plant for a minimum of 10 hours prior to any watering and 24 hours prior to additional mowings. Coordination with irrigation schedule shall be made to achieve maximum results. Moderate rainfall within 10 hours after herbicide spraying shall result in another application. Repeat application as recommended by manufacturers label if desired results are not achieved.

c. Do not spray on a day when the temperature is expected to exceed 90 degrees Fahrenheit. Follow all safety procedures, read all labels and properly calibrate all equipment.

L. Pest Control: Approved insecticides at manufacturers rates shall be used for sod webworms and armyworm control. Control shall be made with Talstar, Chloropyrifos and Orthene. These may be mixed with herbicide applications, if necessary. This program shall be adjusted to target mole crickets if observed.

M. Irrigation System: The system shall be adjusted on a continual basis as necessary to maintain specified coverage. Heads shall be adjusted to elevation when necessary. All repairs to lines, valves, heads, field mixes shall be performed in a timely manner repairing to the previous condition and specifications. Heads shall be cleaned as necessary to insure full pop-up and flush lowered positions. Contractor shall use care not to contaminate the root zone mix when making repairs that require deep excavation below the root zone layer.

   a. Controller shall be set for appropriate watering intervals with adequate instructions to the Owner. When possible, Contractor shall demonstrate the operation of the system and it's controls in the presence of the Owner's or Tenants' Groundskeeper until they reasonably understand the system.

N. Maintenance Log: Record a daily log of all maintenance activities performed on the field through Substantial Completion. These daily records shall be submitted to the Owner and Architect on a weekly basis through Substantial Completion.

   a. Example: **The following represents a SAMPLE** of a weekly submission:

Week Six Maintenance:

11/13/25	Cut entire field.
11/14/25	Adjusted irrigation head height on 4 heads.
11/15/25	Placed Typar cover on the infield, no other work performed. Soil temperature 50^{o}.
11/16/25	At 7:00 a.m. the soil temperature was 3^{o} warmer under the cover, as opposed to not covered. No other work performed.
11/17/25	Removed grass cover. No other work performed. Rain.
11/18/25	Due to great deal of rain and cool temperatures, I applied Snow Mold fungicide at the rate specified in the grow-in program. Watered product into soil for fifteen minutes.
11/19/25	Rain, no work.

Next Week Highlights:
- Cut entire field
- Fix jammed irrigation heads
- Top dressing
- Fertilize with 29-0-0 as specified in grow-in program

O. Stockpile Materials: Provide the following additional materials stored as directed by the Owner.

Material	Quantity
Root zone Mix	45 tons

PART 2 - PRODUCTS

2.1 ACCEPTABLE MATERIALS:

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

   a. Lateral Drain Lines, Collector Lines, and Riser Pipe:

Advanced Drainage System (800) 821-6710
Hancor, Inc. (800) 821-6710

b. Drain Inlet:
Nyloplast (800) 821-6710
National Diversified Sales, Inc., (800)726-1994

c. Geo-textile Filter Fabric:
Mirafi 170N

d. Soccer Goals and Nets – UCS World Competition Soccer Goal, Model #900-8025. Goal Frame, Tie-Back Posts, Nets and Accessories. Supply two (2) removable standards and sleeves (by the following or approved equal):
UCS: 800-526-4856

e. Peat Suppliers:
Pioneer Peat, Inc. (701) 746-4300

f. Sod Suppliers:
i. Tahoma 31 Sod
ii. Contractor to submit sod farm/farms with contact information with bid.

2.2 SOIL MATERIALS

A. General: All fill material, regardless of intended use category, shall be clean and free from organic matter, roots, brush or other vegetation, trash, debris or other detrimental substances, and rocks or unbroken lumps larger than 3 inch, and shall be tested and approved by the soil testing and observation agency prior to placement.

B. Trench Backfill: Existing soils obtained from Playing Field System excavations, excluding broken and pulverized weathered bedrock.

C. Unacceptable Soil Materials: Existing on-site material or asphalt materials not suitable for fill.

D. Gravel Bedding for Irrigation System: Clean, washed pea gravel.

2.3 DRAINAGE SYSTEM MATERIALS

A. Gravel Drainage Material: The gravel shall consist of washed pea gravel or crushed stone that meets the following criteria. Gravel components shall not exceed 12 percent loss of materials as determined by a sulfate soundness test (ASTM C88).

a. 100 % Passing a 12 mm sieve
No more than 10% passing a 2.0 mm sieve
No more than 5% passing a 1.0 mm sieve
Uniformity Coefficient (Cu) = D_{90}(gravel)/D_{15} (gravel) shall be less than or equal to 3.0
D_{15} (gravel) less than or equal to 8 x D_{85} (root zone) {Bridging}
D_{15} (gravel) greater than or equal to 5 x D_{15} (root zone) {Permeability}

B. Lateral Drain Lines, Collector Lines, and Riser Pipe: Perforated Corrugated or Solid Polyethylene Pipe meeting ASHTO M225CP for 3 to 10 inches diameters and ASHTO M294CP for 12 inch to 36 inch diameters. Provide drainage pipe complete with bends, reducers, adapters, couplings, collars, and joint materials. Perforated pipe shall have a minimum inlet area equal to 1.5 square inches per linear foot of pipe.

C. Clean Out: Provide clean out fittings fabricated from ASHTO-M252 polyethylene pipe that include threaded polyethylene cap.

D. Geo-textile Filter Fabric: Nonwoven filter fabric consisting of long-chain synthetic polymers, composed of at least 85 percent by weight polyolifins, polyesters, or polyamides and exhibiting the following physical properties:

Test	Performance	Ref. Standard
Grab Strength	90 lb. minimum	ASTM D4632
Puncture Resistance	50 lb. minimum	ASTM D4833
Mullen Burst strength	195 psi minimum	ASTM D3786
Trapezoid tear strength	40 lb. minimum	ASTM D4533
Permeability	0.1 cm/sec min.	ASTM D4491
Apparent Opening Size	#50 Sieve size	ASTM D4751

2.4 GROWING MEDIUM MATERIALS AND MIXES

A. Root zone Mixture: Organic range of 0.80 to 1.10 percent organic matter on a dry weight basis. Percentage of peat in the sand-peat mix shall be as determined through laboratory testing using performance criteria as outlined under Root zone Mixture Performance and Testing.

a. Processed Sand: The sand shall be non-calcareous, clean and processed and meet the following particle size criteria. Calcareous sand meeting the following criteria will be acceptable only if proven that a local source within a 100 mile radius can not be found to supply non-calcareous material meeting the following criteria.

Size	Particle Diameter(mm)	Allowable Range Percent Retained
Fine Gravel	2.00 – 3.40	Not more than 10% of the total particles in this range, including a maximum of 3% Fine Gravel (preferably none)
Very Coarse	1.00 – 2.00	
Coarse	0.50 – 1.00	Minimum of 60% of the particles in this range
Medium	0.25 – 0.50	
Fine	0.15 – 0.25	Not more than 20%
Very Fine Sand	0.05 – 0.15	Not more than 5%
Silt	0.002 – 0.05	Not more than 5%
Clay	less than 0.002	Not more than 3%
Total Fines	0.05–less than 0.002	Less than or equal to 10%

b. Processed Peat: Reed Sedge Peat shall be free of sticks, stones and other debris and comply with the following:

Parameter	Specifications
Total ash	15% or less
pH	6.5 to 7.5
% Moisture	30% to 50%

Sieve Size	% Passing
2.0 mm	95 - 100
1.0 mm	greater than 80

B. Root zone Mixture Performance and Testing: United States Golf Association (USGA) physical evaluation protocol. Water retention shall be 25 cm tension. Tests shall determine compliance with specified mixing ratio and provide calibration data for the quality control program. Tests shall comply with the following criteria on a core compacted to 14.3 ft. - lb./inches squared:

Test Requirement	Performance
Infiltration Rate inches/hour	12 to 20
Bulk Density, grams/cc	1.2 to 1.6
Total Porosity, percent	35 to 55%
Saturation percentage	35 to 65%

Peat content will be verified using the Walkley-Black organic matter determination process.

2.5 SOD AND GRASS MATERIALS

A. Sod: Tahoma 31 Bermuda hybrid shall be used. DNA testing results are required. Sod shall be grown in a sand based soil medium similar to the root zone mixture specified in this section. Sod shall be 9 -12 months old, machine stripped to a uniform thickness of 3/4" soil below thatch layer no more than 24 hours prior to installation, free of objectionable grasses and broad leafed weeds. Sod shall be big roll cut in approximate widths of greater than or equal to 30 inches and minimum lengths of 50 feet. Sod not displaying the specified soil medium shall be accepted at the sole discretion of the Owner, Architect and the Testing Agent if it can be thoroughly proven that the material cannot be found in a 450 mile radius.

B. Sod Not Grown in the Specified Soil Medium: At the sole discretion of the Owner, Architect and Owner's Testing Agent, sod not grown in the specified soil medium may be accepted if it can be thoroughly proven that the specified material cannot be found within a 450 mile radius. *At the discretion of the Owner and at no cost to the Owner one or more of the following additional requirements apply to sod grown in a non-specified soil medium:*

a. Soil medium shall be free draining material acceptable to the Owner's Testing Agent in particle size and soil characteristics. Sample(s) shall be submitted to the Agent.

b. Aerate the sod installation a minimum of two times after substantial completion, remove all cores, and top dress with a tested and approved root zone mix at a time within the warranty period that the Owner and Architect deem appropriate for the health of the sod. This will be in addition to the top dressings required during installation of the field through substantial completion.

c. Wash soil material from sod prior to shipping and transporting in refrigerated trucks.

d. Wash sod on site after trucking.

PART 3 - EXECUTION

3.1 EXAMINATION AND PROTECTION

A. Verification of Conditions: Examine areas and conditions under which all work of this Section is being performed. Do not proceed with any work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.

B. Protection of Work: Protect all on-going work, so as not to delay work due to weather or project related construction. This includes but is not limited to the use of tarps, geo-textile, plywood and other protective measures.

C. Protect of Persons and Property: Provide all necessary measures to protect workmen and passersby. Barricade open excavations occurring as part of the work, as required by municipal or other authorities having jurisdiction.

   a. Protect adjacent construction throughout the entire operation. Protect newly graded areas from destruction by weather or runoff. Protect structures, utilities, pavements, and other improvements from damage caused by settlement, lateral movement, undermining and washout.

D. Unanticipated Conditions: Notify the Architect immediately upon finding evidence of previous structures, filled materials which penetrate below designated excavation levels, or other conditions which are not shown or which cannot be reasonably assumed from existing surveys and geotechnical reports. Secure the Architect's instruction before proceeding with further work in such areas.

3.2 EARTHWORK EXECUTION

A. General: Remove material of every nature or description encountered in obtaining required lines and grades. Excavate and/or place and compact fill to provide for elevation(s) required by Drawings. Excavation is all considered unclassified and includes excavation to sub-grade elevations indicated, regardless of character of materials and obstructions encountered.

   a. The surface of the playing field is flat/level with the inside edge of the track or the perimeter of the practice field (Alternate bid). The subgrade of the field will be sloped to provide gravity drainage to the collector lines. The lateral drain lines slope within the subgrade. The gravel drainage layer will be installed with a varying depth to provide a “flat” surface and thereby allow the rootzone mix to be a consistent depth through the field.
   b. Conform to elevations and grades shown within a tolerance of plus or minus one-half inch in 25 feet either direction.

B. Drainage System Trenching: Dig trenches to depth and width indicated on the drawings. Abnormal conditions such as large cobbles, or unstable conditions which may cause trench to lose integrity shall be reported to Architect immediately. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum width of twice the pipe diameter.

   a. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil.

   b. Only perform trenching, drainage pipe installation and backfilling operations that can be completed in one day. Exposed trenches which collapse due to rain or other occurrences shall be widened and filled as specified or refilled with sub-grade material, compacted, and retrenched.

   c. Compact the bottoms of all trenches to the density described in placement and compaction of this section. Architect has the option of observing the general trenching operation and will not observe the entire process for approval to backfill the remaining trench areas.

3.3 PLACEMENT AND COMPACTION OF SOIL MATERIALS

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills.

   a. When existing sub-grade ground surface has a density less than that specified under “Compaction” for particular area classification, break up ground surface. Scarify existing sub-

grade to depth of 8 inch prior to compacting. Moisture condition between 3 percent below and 2 percent above optimum moisture content, and recompact to at least 95 percent of standard Proctor density (ASTM D698).

B. Before compaction of sub-grade, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

C. Failings: If, based on the testing and observation agency reports and observations, compacted sub-grade or fills are found to be below specified density, provide additional compaction and testing in accordance with specifications.

D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

   a. Sub-grade Ground Surface and Bottom of Trench Compaction Requirements: Compact soil to not less than 95% of standard Proctor density, with a moisture condition between 3% below and 2% above optimum moisture content in accordance with ASTM D698.

E. Moisture Control: Where sub-grade soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

   a. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

F. Grade Verification: A certified survey shall be performed at 25 foot centers to verify grade and elevation of the sub-grade.

3.4 FIELD DRAINAGE INSTALLATION

A. Sub-grade Grading: Shape surface of areas under gravel drainage material to line, grade, and cross-section, with finish surface not more than one-half inch in 25 feet either direction above or below required sub-grade elevation.

B. Installation of Geo-textile Filter Fabric: Install filter fabric to bottom and sides of trenches. Extend fabric a minimum of 12 inches past each side of top of trench and secure sub-grade. Continue fabric between trenches to cover entire subgrade. (Covering entire subgrade is a conditional requirement from the US Army Corps of Engineers)

C. Laying Pipe Materials: Provide full bearing for each pipe section throughout its length with drainage fill material to true grades and alignment and continuous slope in direction of flow.

   a. Lay perforated pipe in accordance with pipe manufacturers recommendations. Provide collars and couplings as required.

   b. Install locator tape around or on the drainage pipe for future detection after field installation is complete.

D. Clean Out: Cap shall be recessed 12 inch from finish grade as shown on the drawings. Install bolt, washer and nut on cap for metal detection purposes.

E. Testing Drain Lines: Test or check lines before placing drainage fill material to assure free flow. Remove obstructions, replace damaged components, and retest system until satisfactory.

F. Drainage Fill: Place drainage fill material after testing of drainage system in a single layer. Place material around drainage pipe located in trench areas until drainage material is level with the surrounding sub-grade. After filling of trench areas place drainage fill to depth above sub-grade shown in the drawings.

   a. Shape surface of areas under root zone mixture to line, grade, and cross-section, with finish surface not more than one-half inch in 25 feet either direction above or below required sub-grade elevation

G. Backfilling: Do not completely backfill trenches until tests and observations have been made and backfilling is authorized by Architect. Do not use compaction equipment directly over drain lines until sufficient backfill has been placed to insure that such equipment will not damage or disturb drainage lines.

H. Grade Verification: A certified survey shall be performed at 25 foot centers to verify grade and elevation of the gravel drainage blanket layer above the sub-grade.

3.5 PLAYING FIELD GROWING MEDIUM AND MATERIAL MIX INSTALLATION

A. Root zone Mixture: Every load of root zone mix delivered to site may be visually inspected for excessive contamination and obvious clumps of peat not properly ground into the blend. If samples appear to be contaminated or visually different from a uniform blend, a sample shall be sent to the Testing Agent for testing.

   a. Apply the root zone soil mixture over the completed field drainage and irrigation systems to the depth and finish grades indicated on the drawings. Material shall be installed in a moist condition. Root zone mixture shall be installed within 1/4 inch in 25 feet either direction plus or minus of elevation shown on drawings when compacted except where shown flush to adjoining conditions per the drawings. Contractor shall move the root zone mix from the stockpile(s) in such a manner that contaminated materials are not tracked onto the field from the tracks or tires. If determined by the Owner or Architect that contamination is occurring, on-site samples will be taken and tested by the Testing Agent at the expense of the Contractor. Any contamination or overcompacted conditions will require immediate action by the Contractor to satisfy the intent of the specifications. Equipment used on the field shall be of a size and weight and shall utilize turf type tires, tracks or tires which will not damage or overly compact the field installation. Finish grade shall be achieved by using a combination of laser-operated equipment, string lines, drag screens, rollers, and hand raking.

B. Compaction of Root zone Mix: Operate the irrigation system and thoroughly flood the field. Fill all low spots to finish grade with root zone mix and water in. This process shall be repeated as required to bring field to finish grade specifications and tolerance forming a smooth, firm surface. Finish grades and material depths shall be verified utilizing laser operated survey instruments. If roller is used to aid in obtaining field grade, surface shall be scarified prior to laying sod. Field compaction shall not exceed bulk density as performed in laboratory testing.

C. Grade Verification: A certified survey shall be performed at 25 foot centers to verify grade and elevation of the root zone mix material.

3.6 GRASS INSTALLATION

A. Pre-sod Fertilization: Immediately prior to laying sod and after compaction of the root zone mix is complete, incorporate into the upper 1-2 inches of the root zone mix a fertilizer with the following ratios:

   a. 3.8 pounds N (40% soluble, 60% slow release)
      6.5 pounds of P_2O_5
      6.5 pounds K_2O

   b. Micro nutrient package to include 3.4 pounds of Scott's “step” per 1000 square feet or equivalent. Verify types and ratio with Testing Agent prior to application.

   c. This fertilization shall only be installed according to the amount of sod to be laid on that day.

B. Laying Sod: The entire area shall be approved by the Architect and the Owner prior to laying sod. Areas to receive sod shall be firm and the irrigation and drainage system shall be operational. Lay sod within 24 hours from time of stripping. Sod not placed within 24 hours will be rejected.

   a. Lay sod to form a solid mass with tightly fitted joint. Overlap all ends or wherever a break in the big roll occurs and trim to butt tight. Butt sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards when necessary to avoid damage to finish grade. Tamp or roll lightly to ensure contact with sub-grade. If plastic mesh was used to help harvest big roll sod, this material should be removed prior to field installation. Contractor should take care not to rut or damage big roll sod with tires or tracks of the sod machine.

   b. Patching: All patches necessary to fill in undesirable areas shall be of a minimum size of 12 inches in length and width to match that of the roll. Patches shall be of the same source and type as the original installation and shall be installed at specified finish grade and watered in firm.

C. Filling Joints: After laying and rolling of sod, fill joints and seams with approved root zone mixture. Broom or sweep excess material to avoid smothering grass. Sod areas requiring more than 1/4 inch of topdress to meet specified grade shall be lifted and additional rootzone added to raise the sod to acceptable level. Root zone mix shall be added below the sod area and thoroughly compacted prior to the re-installation of the sod area. Thoroughly walk all seams to verify that all have been filled and that all low or irregular areas have been brought to specified grade tolerances.

D. Top Dress Field: Two lifts of 1/4 inch will be required using the same root zone mix as specified previously. Additional top dressing as required to insure a smooth and safe playing surface may be required. Care shall be used to avoid smothering sod.

3.7 IRRIGATION OF SOD

A. General: Begin irrigation as sod is completed in any one section and water to a depth of four inches below the new sod pad. After a short drying period, roll the sod area in two directions to ensure contact with soil mixture and to smooth the area. Water sod areas, as required, through Substantial Completion and until Owner takes possession. Adjust irrigation heads as required for spray pattern and depth to finish grade.

   a. Initially set zones for 3-4 intervals of 15 minutes each or 45-60 minutes per zone per day. Zones with 1/2 heads shall be set for 7-1/2 minutes. Closely monitor moisture levels in the top 4 inches of root zone mixture and at the surface and adjust timing accordingly to climactic conditions and the installed material requirements.

3.8 FIELD EQUIPMENT LAYOUT INSTALLATION

A. General: Layout of the field regarding all painted lines and logos shall be by the Owner following Substantial Completion.

B. The Contractor shall locate and install permanent field sideline and end line string line marks in the concrete track curbs to allow Owner to place string lines for painting. Additionally, the Contractor shall locate the mid field line with a similar mark in the concrete.

D. The Soccer Goal Post shall be located on the centerline of the field and so that the leading edge of the goal is directly above the front edge of the goal line. The location of the Goals, and sleeves shall be located at the beginning of the track and playing field construction. The Contractor shall verify that the above conditions can be met at that time.

E. Corner and mid-field flags will be the responsibility of the Owner.

3.9 FIELD QUALITY CONTROL

A. Quality Control during Construction: Allow testing service to inspect and approve each sub-grade and fill layer before further backfill or construction work is performed.

B. Sub-grade Ground Surface Requirements:

a. Perform density tests in accordance with ASTM A1556, ASTM D2167, or ASTM D2022.

b. Perform moisture tests in accordance with ASTM D3017.

c. Where field testing is performed using nuclear test methods, verify calibration of both density and moisture gages at the beginning of work, on each different type of material encountered, and additionally as directed by the Owner.

d. Fill and Backfill Materials: Test existing on-site soils and borrow materials proposed for use in filling and backfilling operations as follows. Allow testing services to inspect and approve each sub-grade and fill layer before further backfill or construction work is performed.

Moisture Content:	ASTM D2216
Maximum Index Density:	ASTM D4253
Moisture Density Relations:	ASTM D698
Plasticity Index:	ASTM D4318

e. Sub-grade Material: One test for every 2500 square foot of compacted sub-grade material, or major fraction thereof, but in no case less than two tests for each day's work.

C. Irrigation Lines Trenching: Perform one field density and moisture test for every 200 square foot or major fraction thereof, of trench backfill, taken at the bottom of pipe elevation and at 18 inch vertical interval in the compacted fill depth. In no case will less than eight tests be made.

a. Where underground utility lines penetrate foundations, perform field density tests at the bottom of pipe elevation and at every two feet of vertical rise in compacted fill elevation, at points two feet and ten feet in horizontal distance from the foundation wall.

D. Failings: If, based on the testing and observation agency reports and observations, compacted sub-grade or fills are found to be below specified density, provide additional compaction and testing in accordance with specifications.

E. Acceptance of Grass: At the end of each day, the Architect or Owner's Representative shall inspect in place grass for conformance with requirements. Unacceptable grass shall be removed

immediately from the site and replaced the following work day. This preliminary acceptance does not guarantee final acceptance at Substantial Completion.

F. Grass Root Depth: Grass shall display a minimum average of roots 3-1/2 inch in depth prior to acceptance of Substantial Completion.

G. Grade Verification: A certified survey shall be made of the as-built condition at the sub-grade, gravel drainage blanket, and root zone mix for conformance to specified elevations. Three total surveys. Additionally, the settled sand rootzone shall be “string-lined” prior to sod placement. Tolerance is ¼” above or below design grade.

3.10 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including materials not allowed for fill, backfill or site grading as specified within, trash, and debris, and dispose of it properly off Owner's property at Contractor's expense.

END OF SECTION

SECTION 32 31 13

CHAIN LINK 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. Chain-link fences.
2. Swing gates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Fence and gate posts, rails, and fittings.
b. Chain-link fabric, reinforcements, and attachments.
c. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include accessories, hardware, gate operation, and operational clearances.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

A. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates serving as a required means of access.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to comply with performance requirements.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
c. Faulty operation of gate.

2. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:

1. Fabric Height: As indicated on Drawings.
2. Steel Wire for Fabric: Wire diameter of 0.192 inch

a. Mesh Size: 2 inches
b. Galvanized Fabric: ASTM F 668, zinc coated steel wire.
c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.

3. Selvage: Knuckled at both selvages.

2.3 FENCE FRAMEWORK

A. Posts and Rail: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:

1. Fence Height: 72 inches

a. Line Post: 1.9 inches in diameter
b. End, Corner, and Pull Posts: 2.375 inches

2. Horizontal Framework Members: top and bottom rails according to ASTM F 1043.

a. Top Rail: 1.66 inches in diameter

3. Brace Rails: ASTM F 1043.

2.4 TENSION WIRE

A. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire according to ASTM A 817 or ASTM A 824, with the following metallic coating:

1. Type I: Aluminum coated (aluminized).
2. Type II: Zinc coated (galvanized) by electrolytic process, with the following minimum coating weight:

a. Class 3: Not less than 0.8 oz./sq. ft. of uncoated wire surface.

2.5 SWING GATES

A. General: ASTM F 900 for gate posts and swing gate types.

1. Gate Leaf Width: Refer to Drawings
2. Framework Member Sizes and Strength: Based on gate fabric height 72 inches.

B. Pipe and Tubing:

1. Match fence framework.

C. Frame Corner Construction: Assembled with corner fittings.

D. Hardware:

1. Hinges: 180-degree swing.
2. Latch: Permitting operation from both sides of gate.

2.6 FITTINGS

A. Provide fittings according to ASTM F 626.

B. Post Caps: Provide for each post.

1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
2. Rail Clamps: Line and corner boulevard clamps for connecting rails to posts.

E. Tension and Brace Bands: Pressed steel Aluminum Alloy 6063.

F. Tension Bars: **Steel**, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.

2.7 GROUNDING MATERIALS

A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.

1. Connectors for Below-Grade Use: Exothermic welded type.
2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.

B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

    a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
    b. Concealed Concrete: Place top of concrete 2 inches below grade to allow covering with surface material.
    c. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
    d. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches deep and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.

D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.

E. Line Posts: Space line posts uniformly at 10 feet o.c maximum.

F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

H. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

I. Intermediate and Bottom Rails: Secure to posts with fittings.

J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2-inches of bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.

L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side.

3.4 GROUNDING AND BONDING

A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fence and Gate Grounding:

1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
2. Install ground rods and connections at maximum intervals of 1500 feet .
3. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
4. Ground fence on each side of gates and other fence openings.

    a. Bond metal gates to gate posts.
    b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

C. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a ground rod located a maximum distance of 150 feet on each side of crossing.

D. Fences Enclosing Electrical Power Distribution Equipment: Ground according to IEEE C2 unless otherwise indicated.

E. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.

F. Connections:

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

G. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.

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.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

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Section 32 8400 – IRRIGATION SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work required under this section consists of furnishing all labor, materials, accessories, tools and equipment, and performing all operations necessary for the complete installation of the landscape irrigation system including but not limited to the following major items:

1. Irrigation system and related appurtenances
2. Irrigation system sleeving
3. Excavation and backfill of pipe trenches
4. Record drawings and guarantees
5. Permits and licenses
6. Testing of completed system
7. Site clean up

1.2 QUALITY ASSURANCE

A. Manufacturing Qualifications: Provide landscape irrigation system as a complete unit produced by acceptable manufacturers for all portions of work, including heads, valves, piping, controllers, and accessories.

B. Material and workmanship shall be in accordance with local codes and ordinances of legally constituted authorities, except where provisions of these specifications exceed such requirements, these specifications shall govern.

C. Installer shall have the training and experience in the use of equipment and materials required to successfully complete HDPE pipe fusion and associated testing.
1. ASTM D 3350-02 Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
2. ASTM D 2737-03 Standard Specification for Polyethylene (PE) Plastic Tubing.
3. ASTM F 714-08 Standard Specification for Polyethylene (PE) Plastic Pie (SDR-PR) Based on Outside Diameter.
4. AWWA C 901 Standard Specification for Pipe Pressure Classification.
5. AWWA C 906 Standard Specification for Pipe Pressure Classification.
6. ASTM D 3261-03 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
7. ASTM F 1055-98 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
8. ASTM F 2164-02 Standard Practice for Field Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure

1.3 SEQUENCING/SCHEDULING

A. Existing Utilities and Conditions: Prior to cutting into the soil, Contractor shall locate all cables, conduits and other utilities as are commonly encountered underground, and take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, Contractor shall promptly notify the Owner's Representative

who will arrange for relocation. Contractor shall proceed in the same manner if rock layer or any other conditions encountered underground make changes advisable.

B. Install sleeves for all mainline, laterals, and wire that cross roadways, drives, sidewalks, and all other paving surfaces prior to placement of paving. It is the responsibility of the Irrigation Contractor to coordinate timing of sleeve installation and construction procedure with General Contractor to ensure proper sequencing.

C. Give at least five (5) days' notice to the Owner's Representative and General Contractor prior to all required site visits as indicated herein.

1.4 SUBMITTALS

A. Materials List: Within 14 calendar days after award of contract, and before any irrigation system materials are ordered or delivered to the job site, the Irrigation Contactor shall submit to the Owner's Representative, a complete list of all irrigation system materials proposed to be furnished and installed.

1. Show manufacturer's name and catalog cut sheet for each item. When multiple options and/ or models are shown on the material cut sheets, the Irrigation Contractor shall highlight or otherwise clearly indicate which options and/ or models are intended for the specific Project.
2. Upon approval by the Owner's Representative, the manufacturer's recommendations shall become the basis for acceptance or rejection of actual materials and methods of installation used in the work.
3. Materials List: Include sleeving, pipe, fittings, mainline components, sprinkler components, control system components, shop drawings and other components shown on drawings and installation details or described herein. Include pipe sealant, wire, wire connectors, ID tags, and other miscellaneous items. Quantities of materials need not be included.
4. Contractor shall not permit any irrigation system component to be brought onto the job site until it has been approved by the Owner's Representative.
5. Approval of any substitute or alternate items shall indicate only that they apparently meet the requirements of the drawings on the basis of the information submitted and shall not relieve Contractor of any responsibility to provide a fully functional system that meets the intent and spirit of the original design.
6. Shop Drawings: Submit shop drawings of full system design with zone table with water calculations and installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to Construction Documents.

B. Contractor shall provide current Certificates of Training from an Authorized HDPE Fusion Equipment Manufacturer that will demonstrate that the operator is knowledgeable regarding the proper procedures and application HDPE pipe fusion.

C. As Built Drawings: During installation, the Irrigation Contractor shall carefully show in red line on a print of the Irrigation System drawings all changes made to the Irrigation System during installation. Mark-ups shall be legible and updated daily as changes occur. These daily updated prints shall be clean, well maintained in good condition and made readily available for inspection throughout the installation process.

D. Written Maintenance Instructions: Contractor shall include all items requiring maintenance and provide manufacturer's standard maintenance specifications together with their parts lists, local material vendors and guarantees.

E. Submittal of Final As Built Drawings: Upon completion of the Irrigation System installation, and as a condition of its acceptance and final payment to the Irrigation Contractor, the Irrigation Contractor shall deliver to the Owner, the As-Built drawings referenced above. The Irrigation Contractor shall furnish the completed As Built drawings in both paper (full size – (3) copies and ½ size reduced – (3) copies). The delivery of the As-Built drawings shall not relieve the Contractor of the responsibility of correcting any errors that may be found in the As Built drawings at a later date or furnishing any required information that may have been omitted.

1.5 FEES AND PERMITS

A. Work under this Section shall include all fees, permits, licenses, and required inspections by concerned governing agencies.

1.6 WARRANTY AND SUBSTANTIAL COMPLETION

A. All irrigation equipment including controller, master valve, sensors, control valves, rotors, and accessories shall have a five (5) year manufacturer's warranty. All other irrigation equipment, workmanship, and, supplies shall be warranted for one (1) year from date of substantial completion as agreed upon by the Owner's Representative and General Contractor. All warranties shall be turned over to the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Contractor materials shall comply with all requirements and provide irrigation equipment products from only the following:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products not listed within this section may be incorporated into the Work.

2. Irrigation equipment including rotors, control valves, quick couplers, master valves, irrigation controllers, sensors, shall be manufactured by the Rain Bird Corporation.

2.2 DELIVERY, STORAGE AND HANDLING

A. Manufactured materials shall be delivered in original containers with brand and maker's names marked thereon. Materials in broken containers or showing evidence of damage will be rejected and must be immediately removed from the work.

B. Store plastic pipe on flat pallets and protect from sunlight.

2.3 PRESSURE PIPE

A. PVC Main Irrigation supply line.
1. PVC plastic pipe, ASTM D 2241 Class 200 SDR 21.

B. High Density Polyethylene (HDPE) Irrigation supply line.

1. High Density Polyethylene pipe and fittings shall be made from resin meeting the requirements of the Plastic Pipe Institute as PE4710. The resin shall meet the requirements of ASTM D 3350-02 with a cell classification of PE445574C. The pipe shall have a manufacturing standard of ASTM D 2737 and ASTM F 714. The pipe shall be DR 11 (200psi WPR) unless otherwise specified on the plans. All pipe and tubing is free of blisters, internal striations, cracks or any other defects or imperfections. The pipe and tubing are continuously and permanently marked with manufacturer's name, material type, size and schedule or class and quality control identifications. The pipe shall contain no recycles compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, and per AWWA C 901 and C 906 and have normal burst values of three times the Working Pressure Rating (WPR) of the pipe. Pipe shall also have the following agency listing of NSF 61. The HDPE pipe shall be manufactured in a plant capable of providing continuous quality control through inspection. The facility shall have the necessary testing equipment to verify that the pipe meets the requirements of AWWA C901 or C906, NSF Standards and ASTM Standards.

C. Circuit Pipe (downstream from circuit valves): Comply with following:
   1. PVC plastic pipe, ASTM D 2241, Class 200 SDR 21.

D. Seamless Copper Pipe
   1. ASTM B88, Type K, drawn temper.

E. Sleeving Pipe for Irrigation Supply Line:
   1. PVC Schedule 40 plastic pipe, ASTM D 1785 and D 1784, PS 21-70.

F. PVC Fittings:
   1. For PVC plastic pipe, ASTM D 2466 socket fittings with ASTM A 2564 solvent cement.
   2. Metallic: Cast brass with standard iron pipe thread; 125 bl. class rating in conformance with NSF-ANSI 61.
   3. Copper: ANSI B16.22 wrought copper or cast brass, recessed solder joint type fittings.

G. High Density Polyethylene (HDPE) Fittings
   1. Butt Fusion Fittings. Fittings shall be PE 4710 HDPE, cell classification PE445574C as determined by ASTM D 3350-02 and approved for AWWA use. Butt fusion fittings shall have a manufacturing standard of ASTM D 3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All fittings shall be suitable for use as pressure conduits and per AWWA C901 and C906. All fittings shall have a normal burst value of three and one-half times the Working Pressure Rating (WPR) of the fitting.
   2. Electrofusion Fittings. Fittings shall be PE 4710 HDPE, cell classification PE445574C as determined by ASTM D 3350-02 and approved for AWWA use. Electrofusion fittings shall have a manufacturing standard of ASTM F 1055. All electrofusion fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All fittings shall be suitable for use as pressure conduits and per AWWA C901 and C906. All fittings shall have a normal burst value of three and one-half times the Working Pressure Rating (WPR) of the fitting.
   3. Flanged and Mechanical Joint Adapters. Flanged and mechanical joint adapters shall be PE 4710 HDPE cell classification PE445574C as determined by ASTM D 3350-02. Fittings shall have a manufacturing standard of ASTM D 3261. All fittings shall have a normal burst value of three and one-half times the Working Pressure Rating (WPR) of the fitting.
   4. Interchangeability of Pipe and Fittings. HDPE pipe and fittings can be supplied by different manufacturers as long as the meet the ASTM D 3350-02 cell classification.

H. Nipples:
1. Metallic: Schedule 40 red brass (35% copper, 15% zinc) pipe: threaded both ends. Pipe shall be in accordance with ASTM B43.
2. Plastic: Factory-threaded Schedule 80, Type 1, Grade 1 polyvinyl chloride (PVC) pipe, threaded both ends. Pipe shall be in conformance with ASTM D1784 and D1785. Color: grey.

I. PVC Pipe Connection Materials: Solvent, primer and lubricants as recommended by the manufacturer.
1. Joint compound for threaded connections is Teflon or approved equal tape; UL listed.
2. No thinning of solvent or primer is allowed in any manner whatsoever.

J. High Density Polyethylene (HDPE) Joining Methods and Materials
1. Butt Fusion joining; Plain end pipe and fittings shall be made using butt fusion. The butt fusion procedures shall be in accordance with the manufacturer or PPI (Plastic Pipe Institute). The fusion equipment operator shall receive training using the recommended procedure. The Contractor shall be responsible to verify that the fusion equipment is in good operating condition and that the operator has been trained within the past twelve months. Fusion beads shall not be removed.
2. Electrofusion Coupling Joining; Polyethylene pipe and fittings may be joined using approved electrofusion couplings. The electrofusion procedures shall be in accordance with the manufacturer or PPI (Plastic Pipe Institute). The electrofusion equipment operator shall receive training using the recommended procedure. The Contractor shall be responsible to verify that the electrofusion equipment is in good operating condition and that the operator has been trained within the past twelve months.

2.4 BACKFLOW PREVENTION DEVICE

A. The backflow preventer shall be provided by the Owner and of the type required by the local water supplier. Backflow preventer shall be sized to meet flow and pressure requirements of the plans.

2.5 VALVES

A. Manufacturer’s Standard, of type and size required, and as follows:

B. Furnish valves with plastic bodies, unless otherwise indicated.

C. Master Valve
1. Globe valve shall be normally closed 24 VAC 50/60 cycle solenoid actuated with a pressure rating of not less than 200 psi.
2. The valve body and bonnet shall be constructed of heavy duty glass filled UV-resistant nylon and have stainless steel studs and flange nuts with a nylon reinforced nitrile rubber diaphragm.
3. The valve shall have both internal and external manual open/close control to manual open and close the valve without electrically energizing the solenoid. The valve shall house a fully-encapsulated one-piece solenoid.
4. The valve shall have a brass flow control stem for accurate manual regulation and/or shut off outlet flow.
5. Valves shall be Rain Bird PESB-PRS-D series valves sized to meet flow requirements shown on the irrigation plans.

D. Zone Control Valve

1. Globe or Angle configuration valve shall be normally closed 24 VAC 50/60 cycle solenoid actuated with a pressure rating of not less than 150 psi.
2. The valve body and bonnet shall be constructed of high impact, weather resistant PVC with stainless steel screws.
3. The valve shall have manual open/close (internal bleed) control to manual open and close the valve without electrically energizing the solenoid. The valve shall house a fully-encapsulated one piece solenoid.
4. The valve shall have a flow control stem for accurate manual regulation and/or shut off of outlet flow.
5. Valves shall be Rain Bird PESB-PRS-D series valves sized to meet flow requirements shown on the irrigation plans.

E. Quick Coupling Valve
1. Red brass, two piece type construction, 1-inch female iron pipe size connection. The cover shall be a durable, protective self-closing rubber cover vinyl. Quick Coupler valves shall be Rain Bird 44-LRC.

F. Gate Valves
1. Full port, non-rising stem, 125 lbs. cast brass body and parts with wedge disc with cross handle conforming to ANSI B2.1 and complies with NSF-61. Gate valve shall be manufactured by Matco-Norca.

G. Valve Box Cover and Frame
1. Plastic valve box and lids shall be VB Series manufactured by Rain Bird Corporation or equal.

H. Drainage Pit Backfill: Cleaned gravel or crushed stone, graded from 2” maximum to ¾” minimum. AB3 or equivalent is not acceptable backfill material.

2.6 TURF SPORTS FIELD ROTORS

A. Manufacturer’s standard unit designed to provide uniform coverage over entire area of spray shown on drawings at available water pressure.
1. The full or part circle sprinkler shall be a single stream, water lubricated, gear drive type. The part circle sprinkler shall have adjustable arc coverage of 40 to 360 degrees. Arc adjustment can be performed with or without the rotor in operation and shall require only a flat blade screwdriver. The sprinkler shall be capable of full circle (360 degree) operation in either the single direction mode (FC) or the bi-directional mode (PC). The sprinkler shall have a rotating nozzle turret independent of the riser stem. The portion of the riser stem that is in contact with the wiper seal shall be non-rotating. The sprinkler shall have a pressure activated, multi-function, soft elastomeric wiper seal that will clean debris from the pop-up stem as it retracts. The sprinkler body shall have a double-wall construction 1" female (NPT or BSP) bottom inlet. The sprinkler shall have a standard rubber cover which designates the full circle sprinkler from the top, as well as designates each adjustment opening from the top. The sprinkler shall have a front-load nozzle assembly which will allow the nozzle to be installed without a stator bushing change. Pop-up height as measured from the top of the cover to the middle of the nozzle orifice shall be 4 inches
2. The rotor shall have a stainless steel covered nozzle turret and riser stem. The riser stem shall be tapered and conform to the standard plastic riser stem in all other ways.
3. The turf rotor shall be a Rainbird 6504-SS Falcon head manufactured by Rainbird Corporation.
4. The rotor shall be installed using factory preassembled 1” triple swing joints. The swing joint shall be molded from rigid PVC, Type 1, cell classification 12454-B, conforming to

ASTM D1784, with a pressure rating of 315 psi when tested in accordance with ASTM D3139. All rotating joints shall be modified stub ACME threads. All rotating joints shall have two EPDM rubber O-rings for positive sealing and thread protection. The swing joint shall have oversized threaded inlets with large grips and visible thread stops to make hand tightening and installations easier.

5. The triple swing joints shall be TSJ-12 manufactured by Rain Bird Corp.

2.7 AUTOMATIC CONTROL SYSTEM

A. The irrigation controller shall be a Rain Bird ESP-LXME2 Pro manufactured by the Rain Bird Corp.

B. The controller shall be of a hybrid type, housed in a wall-mountable, weather resistant plastic cabinet with a key-locking cabinet door suitable for outdoor installation. The controller shall have a base station capacity of 20 stations as well as expansion slots capable of receiving station modules. Each module shall be capable of receiving expansion modules of 4, 8, or 12 stations to create a controller capacity of up to 48 stations.
   1. The controller shall have 4 separate and independent programs which can have different start time, start day cycles and station run times.
   2. The controller shall have a 365-day calendar with leap year intelligence. The leap year intelligence allows the use of “Odd” or “Even” day watering schedule without changing the date on leap years
   3. The controller shall come standard with SimulStations™ which allows the user to define up to five 24 VAC, 7VA solenoid valves to operate simultaneously per program and total for the controller, including the master valve/pump start circuit.
   4. The controller shall have a Cycle+Soak™ water management feature which is capable of operating each station for a maximum cycle time and a minimum soak time to reduce water run-off.
   5. The controller shall provide an option to assign station priorities to determine the order in which stations shall operate. The controller shall ignore the station number sequence and instead operate the highest priority stations first and the lower priority stations last. Station priorities will be utilized by the FloManager™ feature if the FloManager™ feature is enabled.

C. The controller shall incorporate a Flow Smart Module™ option which adds flow sensing functionality.
   1. The Flow Smart Module™ input shall accept a direct pulse input from a flow sensor with no flow scaling device required.
   2. The flow sensor module shall include a FloWatch™ protection for high and low flow conditions with user defined reactions.
   3. Flow sensing capability (1 input)
   4. Learn Flow - Automatically Learn Flow rates based on real-time usage
   5. Flow Usage Totalizer

D. The controller shall have an IQ Network 4G Cellular Communication IQ-NCC Cartridges compatible with the Rain Bird IQ Central Control System.

E. The flow sensor shall be an in line type with a nonmagnetic, spinning impeller (paddle wheel) as the only moving part. The electronics housing shall be glass-filled PPS. The impeller shall be glass-filled nylon or Tefzel with a UHMWPE or Tefzel sleeve bearing. The shaft material shall be tungsten carbide. The electronics housing shall have two, ethylenepropylene O-Rings and shall be easily removed from the meter body. The sensor electronics will be potted in an epoxy compound designed for prolonged immersion. Electrical connections shall be 2 single conductor 18 AWG leads 48 inches (1.2 meters) long. Duration shall be direct burial “UF” type colored red

for the positive lead and black for the negative lead. Rain Bird Series sensors may be located up to 2000' from Rain Bird field controllers. The meter body shall be brass.

1. All data communications wire connecting flow sensors to the electronics that are buried below grade, with or without conduit, shall be constructed to direct burial specifications similar to Telecommunications Exchange Cable (REA PE-89). The cable shall be constructed of 20 AWG, or larger, copper conductors twisted into pairs of varying lengths to prevent cross talk. Conductors shall be insulated with polyethylene or propylene with a suggested working voltage of 350 volts. The cable shall feature an aluminum-polyester shield and be finished with a black high-density polyethylene jacket.
2. All wire connections be absolutely watertight with no leakage to ground or shorting from one conductor to another. All splices shall be Epoxy-type wire connector kits such as 3M DBR-Y Wire Connector Kits.

F. Low voltage control wire to be used for connecting the automatic controllers to the electric solenoid actuated remote control valves shall be 14-1 NFPA 70 type UF, solid copper, PVC or polyethylene coated insulation, single conductor, UL approved underground feeder cable. Provide one color wire for each of the following:

1. Zone control valves – color red
2. Common wire – color white
3. Spare wire – color blue
4. Master valve – color green

2.8 Wireless Rain Freeze Sensor: Rain Bird WR2 sensor shall employ an electro-mechanical actuating mechanism designed to cause a circuit interrupt if programmable low temperature or rainfall set points are satisfied. Satisfied set points cause the device to temporarily suspend the irrigation controller schedule. As environmental conditions return to a state that no longer satisfy the low temperature or rainfall set points, the controllers normal irrigation schedule is resumed. Shall be FCC approved spread spectrum 2 way radio transceivers with FCC Class B approvals and shall contain a signal transmission distance of 700 feet (213.4 m) Line of Sight. Adjustable rainfall settings from 1/8" to ½" (3 to 13 mm) and have adjustable low temperature settings from 33° to 41°F (0.5° to 5°C). Shall have three irrigation modes to select: Programmed, Suspend Irrigation for 72 hours, and Override sensor for 72 hours.

2.9 MISCELLANEOUS TOOLS AND EQUIPMENT

A. The following list of items shall be submitted to the Owner prior to the final inspection of the irrigation system.

1. 4 quick coupler valve keys
2. 4 hose swivel (1" x 1")
3. 4 gate valve keys (48")

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall install all irrigation system components in accordance with the Irrigation Plans, Details and these Specifications.

B. Schedule of Work: The Irrigation Contractor shall be responsible for the installation of the piping and equipment in a manner that will affect the earliest completion of the work in conformance

with the construction progress schedules of other Contractors and Trades, and these Specifications.

C. Observations: In addition to normal progress inspection, the Contractor shall give at least 48 hours' notice to the Owner's Representative for inspection as follows:
   1. Layout of the system.
   2. Coverage adjustment; Automatic operation.
   3. Punch list inspection.

D. Quick Coupler Valves: Locate quick coupler valves on mainline runs only in locations shown on the plans and near pavement surfaces.

3.2 PROTECTION

A. The Contractor shall be responsible for storage of materials and any damage to the work covered by these Specifications before the final acceptance of the work.

B. Protect work and materials from damage during construction. Storage of polyvinyl chloride (PVC) pipe and fittings shall be protected from direct sunlight. Beds on which materials are stored must be the full length of the pipe to avoid damage. Any pipe that has been damaged or dented shall not be used in the work.

C. Any existing structures, equipment, utilities, pavement, landscaping, etc., damaged by Irrigation Contractor during the course of the work, including any damage caused by leakage or settling of piping systems being or having been installed by them, shall be restored at Contractor's expense and to the Owner's satisfaction.

D. Securely cover openings into the system and cover apparatus, equipment, and appliances, both before and after being set in place, to prevent obstruction in the pipes and the breakage, misuse or disfigurement of the apparatus, equipment or appliances.

3.3 LAYOUT AND VERIFICATION

A. The Contractor shall stakeout the locations of all piping, quick coupling valves, and emitters in accordance with the irrigation design drawings. The Contractor shall check and verify dimensions of layout and report variations to the Owner's Representative before proceeding. Layout work as accurately as possible to the drawings.

B. Minor changes in locations to the above from locations shown shall be made as necessary to avoid existing or proposed planting, piping, utilities, structures, etc., at the Contractor's expense, or when directed by the Owner's Representative, providing such change is ordered before such items or work directly connected to same are installed, and providing no additional materials are required.

C. The Contractor will be held responsible for the relocating of any items without first obtaining the Owner's Representative's approval. The Contractor shall remove and relocate such items, at his expense; if so directed by the Owner's Representative.

D. Before starting work on irrigation system, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths. The Contractor shall be aware of the fact that the drawings are horizontal dimensions. Actual measurements taken along the slope of a bank will differ from those shown on the drawings.

E. No PVC fittings shall be installed on pipe underneath pavement or walls except where noted on the Irrigation drawings. If such a need should occur, the Contractor shall bring it to the attention of the Owner's Representative.

F. Exact sprinkler head placement is based on and shall be coordinated with actual playing field layout and shall be verified by the Owner's Representative.

G. All changes shall be recorded daily on the Record Drawings.

3.4 TRENCHING AND BACKFILLING

A. Provide a minimum of 18" cover over top of PVC main line, and a minimum of 12" cover over top of lateral piping.

B. Backfill with clean material from excavation. Remove organic material as well as rock and debris larger than 1" diameter. Irrigation piping shall have no rock or debris touching at any point along its length. A minimum of 6" clearance is required around all piping from all immovable obstructions. Place acceptable backfill material in 6" lifts, compacting each lift separately.

C. Backfill trench to within 6" of finished grade. Continue fill with acceptable topsoil and compact to bring even with existing grade. Thorough compaction at each sprinkler head, valve, and piping will be required. Repair all settled areas.

D. Boring underneath existing pavement may be required. PVC sleeving for irrigation main line shall be installed underneath all pavements.

E. Unless otherwise indicated, comply with requirements of the Uniform Plumbing code, city specifications, and all state or local codes.

3.5 CIRCUIT VALVES

A. All valves shall be connected to main irrigation line in a plumb position. Each valve shall be installed in a valve box so that all parts of valve can be serviced. Valve boxes shall be installed over 6" of drainage gravel and shall be set so that the cover is flush with finish grade. Thorough compaction at valve boxes is required

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. Provide pressure regulation modules on the control valves for all zones that exceed recommended operating pressure by 20% as indicated in the irrigation zone schedule.

3.6 PIPING

A. Lay pipe in properly excavated trenches.

B. For all mainline piping, slope to manual drain valve and drainage pit at least ½" in 10' of run.

C. HDPE fusion of pipe and fittings. Sections of HDPE pipe should be joined into continuous lengths on the jobsite above ground. The joining methods shall be butt fusion or electrofusion

method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The fusion equipment used in the joining procedure should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements, alignment and an interfacial fusion pressure of 75 psi. The fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.

D. Install PVC pipe in dry weather when temperature is above 40 F in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperatures above 40 F (4 C) before testing, unless otherwise recommended by manufacturer.

E. Manual Drain Valves: Install manual drain valves at all low points in main irrigation supply line.

F. Sleeves: Install sleeves for all main line, laterals, and wire that cross roadways, drives, sidewalks, and all other paving surfaces. Sleeves shall be a minimum of 4" diameter, and shall be sized to accommodate all equipment necessary. Top of sleeves shall be a minimum of 18" below surface of paving. Sleeves shall extend a minimum of 6" behind back of curb. Permanently mark location of each end of sleeve on back of curb.

3.7 SPORTS ROTOR HEADS

A. Flush circuit lines with full head of water and install heads after mainline is completely installed.

B. All rotor heads shall be set plumb at the elevation to be flush with finish grade.

C. Contractor shall adjust, if necessary, the elevation of the rotors after finish grade are completed.

D. Install all rotor heads with factory assembled swing-joints.

3.8 CONTROLLER

A. Automatic controller shall be mounted in the locations approved by the Owner on drawings.

B. Contractor shall insure that controllers are properly programmed by the manufacturer for this particular job prior to their installation.

C. Control wire of system shall be 14 gauge, specifically designed for direct burial use. A minimum of 4'-0" of extra wire shall be spooled at each valve location.

3.9 HYDROSTATIC TESTING

A. If determined by the Owner, all mainline piping may be subjected to a hydrostatic test. The mainline test shall be completed and documented prior to the installation of any control valves. If required, the Contractor is to supply all testing equipment including all caps and gauges as required.

B. Pressure gauges shall be read in PSI. Calibration shall be such that accurate determination of potential pressure loss can be ascertained. Test supply line at a pressure of 120 PSI for minimum of one hour with an allowable loss of 5 PSI.

C. Re-test as required until the system meets the requirements. During the tests, regardless of the amount of leakage, all detectable leaks are to be stopped and all defects corrected.

3.10 ADJUSTING THE SYSTEM

A. Adjust alignment and coverage of all rotors if it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage. Make all necessary changes or make arrangements as directed by Owner's Representative. These changes or adjustments shall be made without additional cost.

3.11 GUARANTEE AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall fill and repair all depressions and replace all necessary sports turf areas due to the settlement of irrigation trenches for one year following the completing and acceptance of the job.

B. The Contractor shall also guarantee all materials, equipment and workmanship furnished by him to be free of all defects of workmanship and materials, and shall agree to replace at his expense, at any time within one year after installation is accepted, any and all defective parts that may be found. Contractor shall transfer all manufacturer material warrantees to the Owner. All manufacturer warrantees shall be in effect for the period outlined in the manufacturer literature from the date of installation. Contractor shall detail these warrantees and provide all necessary information regarding them to the Owner in the record drawing submittals.

C. After the system is installed and approved, the Contractor shall operate the irrigation system for the Owner and / or Owner's Representative for verification of operation of the on-site equipment and interface with off-site Central Control Software.

END OF SECTION

SECTION 33 1113 –WATER DISTRIBUTION 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 water-distribution piping and related components outside the building for water service and fire-service mains.

1.3 DEFINITIONS

A. HDPE: High-Density Polyethylene Plastic

B. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated

1.5 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.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: water valves and specialties to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with standards of Missouri Department of Natural Resources for potable-water-service piping, including materials, installation, testing, disinfection, and all requirements of the MU system guidelines.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. 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.

D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including yard hydrants, according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flange faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
   1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
   2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrant if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

PART 2 - PRODUCTS

2.1 MATERIALS, PIPE AND PIPE FITTINGS

A. All underground water piping shall be PVC.
   1. EXCEPTION 1: Domestic water service lines 2” or less shall be Type K copper or high density polyethylene (HDPE) piping.
   2. EXCEPTION 2: Lines passing directly over or under steam tunnels or direct buried steam/condensate lines must be ductile iron or Type K copper (2” or less) with 4" R-5 extruded polystyrene insulation board between the pipe and steam lines.

B. PVC Pipe (Open Trench Construction)
   1. 4 Inches to 12 Inches: AWWA C900; Pressure Class 235 (DR 18); Cast Iron O.D. equivalent; with bell end and elastomeric gasket.
   2. 14 Inches to 48 Inches: AWWA C905; Pressure Rating 165 (DR 25); Cast Iron O.D. equivalent; with bell end and elastomeric gasket.
   3. Gaskets: ASTM F 477, elastomeric seal.

C. Ductile-Iron Pipe
   1. 4 Inches to 12 Inches: AWWA C151; Mechanical Joint Pipe; Minimum Thickness Class 52 or Pressure Class 350; with integrally cast flanged bell, cast iron gland, and rubber gasket.
   2. Lining: Standard cement lining with asphalt coating.
   3. Encasement: AWWA C105, polyethylene film.

D. High-Density Polyethylene (HDPE) Pipe and Fittings)

1. 2 Inches and Less: SDR9 CTS Premium Grade Pipe, AWWA C901, ASTM D3035, NSF 14 and 61, 200 psi pressure rating. Pipe to be CenCore HDPE as manufactured by Centennial Plastics or approved equal.
2. Fittings and Joints: All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe pressure rating. All fittings shall be molded or fabricated by the pipe manufacturer. Connections must be made by either the use of brass/stainless steel compression couplings with insert rings or by creating a fusion butt weld all in strict accordance with manufacturer's recommendations. All brass fittings shall be lead free.

E. Pipe Fittings
1. 4 Inches to 24 Inches: AWWA C153; 350-psi pressure rating.
2. Lining: Standard cement lining with asphalt coating.
3. All pipe fittings shall be ductile-iron construction, installed wrapped with AWWA C105 polyethylene film.

F. Restraints
1. Mechanical joint: AWWA C111. Provide retainer type packing glands with rubber gasket, for use with PVC pipe and conforming to Uni-B-13-
2. 92. Pipe sizes 4" to 12" must also be FM approved. Mechanical joint restraints shall be Megalug 2000 PV, as manufactured by EBAA Iron Inc., Eastland TX, or approved equal.
3. Joint Retainers: Provide ductile iron split serrated ring harnesses and rod type joint retainers for PVC bell and spigot joints. Clamps shall be designed for use with PVC pipe and shall meet Uni-B-13-92 Standards and be FM approved on sizes 4" to 12". Restraint harnesses shall be Series 1500 for pipe 4 inches to 12 inches, and Series 2800 for pipe 14 inches and larger, all as manufactured by EBAA Iron Inc., Eastland TX or approved equal.
4. Rods, nuts and washers: ¾" SS304 all thread rods, nuts and washers.
5. All pipe restraints and ductile iron fittings shall be installed wrapped with AWWA C105 polyethylene film.
6. Link Assembly: Seal annular space for piping passing through walls with interlocking synthetic rubber link assembly, Link-Seal® as manufactured by PSI-Thunderline Corporation, Houston TX, or approved equal.
7. Pipes, fittings, valves, meters, and other appurtenances containing more than .25 percent lead calculated by weighted average shall not be used. System design, materials, and installation of water systems shall comply with "Minimum Design Standards for Missouri Community Water Systems" (latest edition) as published by Missouri DNR.

G. Trace Wire
1. Tracer wire shall be #14 AWG Solid, steel core soft drawn high strength tracer wire, 250# average tensile break load, 30 mil high molecular weight-high density blue polyethylene jacket complying with ASTM-D- 1248, 30 volt rating. No THHN insulated wire shall be allowed. Tracer wire shall be Copperhead Industries HS-CCS or approved equal.
2. Tracer wire shall have moisture resistant splices for direct bury applications. Splices shall be Copperhead Industries Snakebite or 3M DBR or approved equal.
3. Tracer wire test stations shall be designed to be easily detected by magnetic and electronic locators. A magnet shall be securely attached at the top of the upper tube of the box for locating purposes. Lid shall be blue and have a brass terminal for attaching locating equipment and a brass 5 sided nut for removing cap. Tracer wire test station shall be Copperhead Industries Snake Pit or approved equal.

2.2 JOINING MATERIALS

A. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to ends compatible with, piping to be joined.
   1. Dielectric-Flange Insulating Kits:
      a. Description:
         1) Nonconducting materials for field assembly of companion flanges.
         2) Pressure Rating: 150 psig
         3) Gasket: Neoprene or phenolic
         4) Bolt Sleeves: Phenolic or polyethylene
         5) Washers: Phenolic with steel backing washers.
   2. Dielectric Nipples
      a. Description
         1) Standard: IAPMO PS 66
         2) Electroplated steel nipple, complying with ASTM F 1545
         3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C)
         4) End Connections: Male threaded and grooved
         5) Lining: Inert and noncorrosive, propylene.

2.4 VALVES AND VALVES BOXES

A. Non-rising Stem Gate Valves: ANSI/AWWA C509, resilient seated, lead free, bronze stem, cast-iron or ductile-iron body and bonnet, epoxy coated disc, stem nut, 250 psig working pressure, mechanical joint ends. Valves shall be Model A-2360 as manufactured by Mueller Company, Decatur IL, or approved equal. Valves shall turn clockwise to close.

B. Ball Valves: Threaded lead free bronze, 125 lb., 2-piece design, full port. Valves shall be Model T-FP-600A-LF-LL as manufactured by NIBCO, Elkhart IL, or approved equal.

C. Valve Boxes: Valve box shall be 6" PVC C900 pipe with cast iron cover No. 2195 as manufactured by Clay and Bailey Manufacturing Company, Kansas City MO, or approved equal. Lid shall be marked "WATER".

D. Multi-fit Adaptor: All valve boxes shall be installed upon the valve with the use of a Multi-Fit Adaptor (MFA) as manufactured by Adaptor Inc. or an approved equal. SKU # 90004.

2.5 METERS

A. All externally installed water meters shall be bronze disc as manufactured by BadgerMeter, Milwaukee, WI. Substitutes will not be accepted.

B. Nutating Disc Meter
   1. Construction shall comply with ANSI and AWWA C700 standards as required for domestic water metering applications.
   2. Meter housing and housing top plate shall be lead free cast bronze construction. The measuring chamber, disc, strainer, and generator housing shall be thermoplastic construction. Register lid and box shall be thermoplastic and bronze and trim shall be stainless steel or bronze.
   3. Register shall be a straight-reading odometer-type totalization display (gallons), 360 degree test circle with center sweep hand and flow finder to detect leaks. Register shall be installed using TORX tamper resistant seal screws. Meters shall be provided with an integral strainer. A tamper resistant calibration plug seal shall also be provided to protect from unauthorized personnel.
   4. Meters shall be Recordall disc models 35, 70, 120 and 170.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Section 312000 “Earth Moving” for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

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.

D. Flanges, unions, grooved-end-pipe couplings, and special fitting may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 3/4 to NPS 3 (DN 20 to DN 80) 1-inch to 2-inch shall be the following:
   1. PE, ASTM pipe; insert fittings for PE pipe; and clamped joints.

3.3 PIPING INSTALLATION

A. Preparation of Trench
   1. Trench bottom shall be graded to provide a smooth, firm, stable, and rock-free foundation throughout the length of the piping.
   2. All rock greater than one inch in diameter found in the trench shall be removed for a depth of six inches below the bottom of the pipe and replaced by suitable bedding material.
   3. Unstable, soft, and unsuitable materials shall be removed at the surface upon which pipes are to be laid and backfill with crushed stone as indicated on the drawings.
   4. Layers of crushed stone shall be installed in the bottom of trench as indicated on the drawings. Shape stone layer to fit bottom of piping. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

B. Pipe Separation
   1. Finished pipe installation shall have minimum 12" separation to all other utilities.
   2. Maintain at least a ten foot (10’) horizontal separation of water mains from any existing or proposed sanitary sewer. The distance must be measured edge to edge. Installation of the water main closer to a sanitary sewer is acceptable where the water main is laid in a separate trench or on an undisturbed earth shelf located on one (1) side of the sanitary sewer at an elevation so the bottom of the water main is at least eighteen inches (18”) above the top of the sanitary sewer.
   3. Provide a minimum vertical distance of eighteen inches (18”) between the outside of the water main and the outside of the sanitary sewer where water mains cross the sanitary sewer mains. This shall be the case where the water main is either above or below the sanitary sewer. At crossings, one (1) full length of water pipe must be located so both joints will be as far from the sanitary sewer line as possible. Special structural support for the water and sanitary sewer pipes may be required.
   4. Provide at least a ten-foot (10’) horizontal separation between water mains and sanitary sewer force mains. There shall be an eighteen-inch (18”) vertical separation at crossings
   5. Locate water mains so that they do not pass through or come in contact with any sanitary sewer manhole
   6. Consult the system owner where above conditions cannot be met.

C. Installation of Pipe and Pipe Fittings

1. Piping 2" and less:
    a. All domestic water service piping from the water main to the building with a nominal diameter of two inches and less shall be Type K copper or HDPE piping.
    b. In all installations, Type K copper shall be used where the water line enters the building. If the water meter is located in a meter pit, the piping within the meter pit, and stubbed out on either side shall also be Type K copper.
    c. All buried copper piping shall be wrapped
    d. For pulled pipe installations, tracer wire shall be pulled with pipe, without splices. Upon completion of installation, a continuity test on the wire shall be performed and all breaks shall be repaired.
    e. For trenched pipe installation, tracer wire shall be taped to the pipe at the three o'clock position every 5 feet. Upon completion of installation, a continuity test on the wire shall be performed and all breaks shall be repaired.
2. PVC (Polyvinyl Chloride) Pipe: Install in accordance with AWWA C605.
3. All joints shall be restrained with joint retainers. All fittings shall be restrained with retainer type packing glands.
4. Install stainless steel rods between fittings on all offsets and between fittings, valves, and blind flanges, in addition to the Megalugs. On isolated fittings, valves, etc., attach restraint rings to PVC pipe and install stainless steel rods between fitting and restraint rings. Rods shall be positioned through the bolt holes in fitting and Megalug. Each rod will require four nuts and washers. Duct lugs are acceptable. The number of stainless steel rods required per fitting flange shall be as follows:

Pipe Diameter	No. of Rods
10" and Less	2
12"	3
14"	4
16"	5
18"	6

5. All ductile iron pipe, fittings, valves, bell end restraints, etc. shall be wrapped with a polyethylene cover conforming to AWWA C105, and installed per AWWA C600.
6. All dead end mains shall have a dry barrel fire hydrant at the end to facilitate flushing of the main.
7. Pipe shall be installed in clean condition, and shall never be laid in trenches with standing water. The trench shall be dewatered during installation of the water line. Open pipe ends shall be protected with a hard cap or inflatable plug at the end of the work day. NO PLYWOOD OR DUCTTAPE COVERINGS WILL BE ALLOWED.

D. Backfill

1. Under Pipe: All backfill under the barrel of the pipe shall be free from debris, organic matter, and stones larger than one inch, and shall be tamped into place. Sand or crushed stone aggregate (95% passing a ½" screen but not more than 10% passing a #200 sieve) are acceptable substitutes for soil.
2. Adjacent To and Top of Pipe: The first one foot of backfill over the top of pipe shall be "3/4 inch minus waste rock with fines" uncleaned crushed stone aggregate or suitable soil. Backfill shall be free of debris, brush, roots and stones or rubble more than one inch.
3. Rough final grading of subgrade and the placement of final topsoil shall be detailed on the drawings.
4. All sidewalks, paving, etc. which are removed or damaged during construction shall be replaced and shall match existing.

E. Identification

1. Install continuous plastic underground warning tape during back-filling of trench for underground water piping. Tape shall be located twenty-four (24) inches above pipe, directly over each water line.

2. Tape trace wire to the top of each water line with duct tape every five (5) feet. Wire splices shall be minimized. Terminate trace wires inside building and inside valve boxes. Drill ¼" hole in PVC valve box one inch below cast iron cover. Route wire up outside of valve box, through ¼" hole and knot. A tracer wire test station shall be installed at all fire hydrants and at all runs of piping without valves every 400 feet. Upon completion of installation and final grading, a continuity test on the wire shall be performed and all breaks shall be repaired.

F. Install HDPE pipe according to ASTM D 2774 and ASTM F 645.

G. Bury piping with depth of cover over top at least 42 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:
1. Under Driveways: With at least 42 inches (910 mm) cover over top
2. In Loose Gravelly Soil and Rock: With at least 12 inches (300 mm) additional cover.

H. Extend water-service piping and connect to water-supply source and building-water piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

3.4 VALVE/VALVE BOX INSTALLATION

A. Valve Installation.
1. Domestic Water Service: AWWA-Type Gate Valves: Comply with AWWA C600. Install buried valves with stem pointing up and with valve box.
2. Valve boxes shall be installed vertically with top of box even with final grade.
3. All valve boxes shall be installed upon the valve with the use of a Multi-Fit Adaptor (MFA). The MFA shall be installed in lieu of hardwood blocking and shall be incidental to the valve and box installation. Install per manufacturer's published installation procedures.

3.5 CONNECTIONS

A. Connect water-distribution piping to interior domestic water and fire-suppression piping.

3.6 FIRE HYDRANT INSTALLATION

A. Installation of fire hydrants maintained by the University shall be installed per "Fire Hydrant Detail" and in strict accordance with manufacturer's written instructions.

B. The pumper nozzle shall be installed pointing to the street and/or away from the building.

C. Newly installed fire hydrants shall be cleaned and pressure tested in accordance with standards set forth in section 3.7 below.

3.7 FIELD QUALITY CONTROL

A. Cleaning
1. All domestic potable water systems shall be clean and free of foreign matter and shall be disinfected and tested for bacteriological contamination before the system is put into operation, as required by the State Division of Health and in accordance with AWWA C651 or C652.
2. All domestic potable water systems will be pressure tested in accordance with AWWA M23.

a. Pressure Test shall be performed at 150 psig for 2 hours.

3. Disinfection shall be performed AFTER leak and pressure tests are completed.
4. Water line shall be completely separated from water system for pressure test and disinfection purposes.
5. Contractor shall install number and size of taps based on the water line size in the table below:

Pipe Diameter (in)	2” Taps Needed
4”	1
6”	1
8”	1
10”	2
12”	2

6. Contractor shall install water line entrance and exit piping which enters and exits above ground as shown in “Taps for Flushing and Disinfection of Water Line drawing referenced below. The purpose of this piping is to provide a means for flushing, pressure testing, and disinfecting the new water line.
7. Contractor shall perform pressure testing and disinfection of new water lines. Contractor shall prepare water line for testing and disinfection. Notify Owner’s Representative at least 72 hours prior to requesting disinfection of a new water line. Contractor shall draw and send samples for testing. Allow 24 hours for disinfection of the water line and an additional 48 hours for return of testing prior to connecting to existing system. Contractor to allow a minimum of 5 working days in schedule for this work by owner.
8. Fill the system with a water-chlorine solution containing at least 50 parts per million of chlorine, valve off, and allow to stand for at least twenty-four (24) hours; or fill system with a water-chlorine solution containing at least 200 parts per million of chlorine, valve off, and let stand for three (3) hours.
9. After allowed standing time, flush the system with clean potable water until no chlorine (in excess of public water supply) remains at any point of outlet.
10. The system shall be thoroughly and completely flushed at maximum water pressure, and if it is shown by a bacteriological examination made by the Owner that contamination still persists in the system, the above procedure shall be repeated.
11. The contractor shall be responsible for taking and sending the sample for testing.
12. Allow forty-eight (48) hours for return of testing before making tie-ins to existing system.

3.8 METER INSTALLATION

A. Installation of water meter, valving, bypass loop and water sampler/test outlet shall be in strict accordance with manufacturer’s printed instructions and recommendations, applicable ANSI and AWWA requirements, and as detailed on University of Missouri “Water Meter Detail” drawing.

B. Water meter shall be installed in an exterior below-grade meter pit. These pit installations shall be installed in strict accordance with manufacturer’s printed instructions and University of Missouri “Meter Box Pit Detail” drawing.

C. Water meters shall be installed with a three-valve bypass design using ball valves (2" or less) or OS&Y rising stem gate valves (larger than 2"). The bypass valve shall be full-flow and capable of being locked. All other valves associated with the meter installation shall be ball valves.

D. Water meter shall be installed after the backflow prevention device but prior to any booster pumps or pressure reducing valves.

3.9 COMMISSIONING

A. System shall be placed in operation only after testing shows the absence of bacteriological contamination and approved by system owner.

B. Only Campus Facilities - Energy Management Steam and Water personnel will be allowed to operate valves on new water systems. All valves installed as part of new construction shall remain fully closed during construction.

END OF SECTION 33 1113

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33 4100 – 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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building and within manholes, with the following components:

1. Special fittings for expansion and deflection.
2. Cleanouts.
3. Drains.
4. Precast concrete, cast-in-place concrete, or plastic junction boxes.
5. Hub-and-spigot, cast-iron soil pipe and fittings.

1.3 DEFINITIONS

A. HDPE: High density polyethylene plastic pipe.

B. PVC: Polyvinyl chloride plastic pipe.

C. RCP: Reinforced concrete pipe.

D. HPP or HP Storm: high-performance polypropylene pipe.

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.
2. Cast-iron Drain rated for 212 degrees Fahrenheit.
3. Channel drainage systems.

B. Shop Drawings: For the following:
1. Manholes: Include plans, elevations, sections, details, and frames and covers.
2. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, and design calculations.

C. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS – FOR 12” AND SMALLER STORM PIPES PER PLANS.

A. PVC Profile Gravity Sewer Pipe and Fittings: PVC conforming to ASTM D2241, PVC 1120, DR 21, PR 200 (SDR-21). Color: Green. With bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

2.2 RCP PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M) or AASHTO M170 , with bell-and-spigot or groove and tongue ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets.
1. Class III, Wall C.

2.3 HPP OR HP STORM – FOR 12” AND LARGER STORM PIPES PER PLANS.

A. High Performance Polypropylene Pipe (HPP or HP Storm) having a smooth interior and an annular corrugated exterior.
1. Where up to 30 inches in diameter, HPP pipe shall meet or exceed ASTM F2736.
2. Where 36 to 60 inches in diameter, HPP pipe shall meet or exceed ASTM F2881.
3. AASHTO loading requirements shall be met.
4. Minimum gage of piping shall be per manufacturer’s recommendations.

2.4 HDPE PIPE

A. All HDPE pipe shall conform to AASHTO M294, Type S. HDPE pipe to be ADS N-12 WT IB (water tight, integral bell) smooth interior, dual wall or approved equal. For 48” diameter pipe and smaller, minimum cover shall be one foot. For 54” and 60” diameter pipe, minimum cover shall be two feet, or per plans. All HDPE pipe shall contain a minimum content of 2% carbon black as required by ASTM D3350. Pipe shall be furnished with an integral reinforced bell with a bell tolerance device and elastomeric gasket to meet ASTM F477 and ASTM D3212.

2.5 GENERAL FITTING AND CONNECTION REQUIREMENTS FOR ALL PIPE PRODUCTS

A. All connections and fittings shall be compatible and approved for use with piping system being installed.

B. Tee connections into storm sewer piping shall be Inserta-Tee lateral connection manufactured by ADS Pipe or MU Engineer approved equal.

2.6 NONPRESSURE-TYPE 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.

B. Sleeve Materials:
   1. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.
   2. For Cast-Iron Soil Pipes: ASTM C 564, rated at 212 Degrees Fahrenheit.
   3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
   4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.7 CLEANOUTS

A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.8 JUNCTION BOX/ MANHOLE STRUCTURES

A. Precast Concrete Junction Box/Manholes: ASTM C 913; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
   1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole, as required to prevent flotation.
   2. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
   3. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
   4. Steps: Steps shall be Neenah 1980-J, Deeter 1606, M.A. Industries PS2-PF, or equal. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.
   5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
   6. Protective Coating: Plant-applied, coal-tar; 10-mil (0.26-mm) minimum thickness applied to exterior surfaces.
   7. Manhole Frames and Covers: Deeter 1247, Neenah R-1642, or exact equal frame and lid. The lid shall be lettered with the words ‘Storm Sewer’ or ‘Storm Drain’.
   8. Manholes shall have eccentric top sections.

2.9 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
   1. Cement: ASTM C 150, Type II.

2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.10 Tracer Wire and Test Stations

A. Tracer Wire shall be #14 AWG solid, steel core soft drawn high strength tracer wire, 250# average tensile break load, 30 mil High Molecular Weight (HMWPE) or High Density (HDPE) polyethylene jacket complying with ASTMD-1248, 30 volt rating. Jacket color shall be green. No THHN insulated wire shall be allowed. Tracer wire shall be Copperhead Industries HS-CCS or approved equal. The tracer wire shall be taped to the pipe at the three o'clock position every 5 feet. The tracer wire ends will terminate at a tracer wire test station.

B. Tracer wire shall have moisture resistant splices for direct bury applications. Splices shall be Copperhead Industries Snakebite or 3M DBR or approved equal.

2.11 WARNING TAPE

A. Install warning tape at least 12" above the top of pipe. Warning tape shall be 100% plastic.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 312000 Section "Earthwork."

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 nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.

a. Unshielded flexible couplings for same or minor difference OD pipes.
b. Unshielded, increaser/reducer-pattern, flexible 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 for force-main 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 pipe materials as shown on the Site Development Plans.

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 of 1 percent, unless otherwise indicated.
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 corrugated steel piping according to ASTM A 798/A 798M.
4. Install corrugated aluminum piping according to ASTM B 788/B 788M.
5. Install HDPE corrugated sewer piping according to manufacturer’s recommendations."
6. Install hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
7. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
8. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
9. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

G. Pipe shall be installed per manufacturer’s instructions and ASTM D2321-20.

3.4 PIPE JOINT CONSTRUCTION

A. 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 steel sewer piping according to ASTM A 798/A 798M.
   2. Join corrugated aluminum sewer piping according to ASTM B 788/B 788M.
   3. Join corrugated HDPE piping according to CPPA 100 and the following:
      a. Use silttight couplings for Type 1, silttight joints.
      b. Use soiltight couplings for Type 2, soiltight joints.
   4. 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.
   5. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
   6. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
   7. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.5 PIPE FITTING INSTALLATION

A. Fittings shall be installed per manufacturer’s instructions and ASTM D2321-20.

B. Inserta-Tee penetrations into storm sewer pipe shall be made with correctly sized Inser-ta-Tee core saw per ADS instruction.

3.6 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections according to ASTM C 891.

C. Construct cast-in-place manholes as indicated.

D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3.7 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.8 STORMWATER INLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipaters at outlets, as indicated.

3.9 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

B. Clean and prepare concrete manhole surfaces for field painting. Remove loose efflorescence, chalk, dust, grease, oils, and release agents. Roughen surface as required to remove glaze. Paint the following concrete surfaces as recommended by paint manufacturer:
   1. Cast-in-Place-Concrete Manholes: All exterior, except bottom.
   2. Precast Concrete Manholes: All exterior.

C. Prepare ferrous frame and cover surfaces according to SSPC-PA 1 and paint according to SSPC-PA 1 and SSPC-Paint 16. Do not paint surfaces with foundry-applied, corrosion-resistant coating.

3.10 TRACER WIRE INSTALLATION

A. Tracer Wire test stations shall be installed within 2 feet of the manhole or structure in the flow line of the pipe. These test stations shall be designed to be easily detected by magnetic and electronic locators. A magnet shall be securely attached at the top of the upper tube of the box for locating purposes. Lid shall be green and have a brass terminal for attaching locating equipment and a brass 5 sided nut for removing cap. Tracer wire test station shall be Copperhead Industries Snake Pit or approved equal.

3.11 IDENTIFICATION / WARNING TAPE

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 12” min. over ferrous piping.
   2. Use detectable warning tape 12” min. 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 (610 mm) 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. 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 authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

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.

END OF SECTION 33 4100

SECTION 33 46 00

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. Section Includes:

1. Perforated-wall pipe and fittings.
2. Drainage conduits.
3. Geomembrane Liners

1.3 ACTION SUBMITTALS

A. Product Data:

1. Drainage conduits, including rated capacities.
2. Geomembrane liners.

PART 2- PRODUCTS

2.1 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 Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.

2.2 SOIL MATERIALS

A. Soil materials are specified in Section 312000 "Earth Moving."

2.3 GEOMEMBRANES

A. Description: LLDPE liner with minimum of 20 mil thickness meeting ASTM D5199 standards

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 Section 312000 "Earth Moving."

3.3 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
   1. Lay perforated pipe with perforations down.
   2. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install thermoplastic piping according to ASTM D 2321.

3.4 PIPE JOINT CONSTRUCTION

A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.

B. Join perforated PVC sewer pipe and fittings according to ASTM D 3212 with loose bell-and-spigot, push-on joints.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 CONNECTIONS

A. Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.

3.6 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 33 46 00

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